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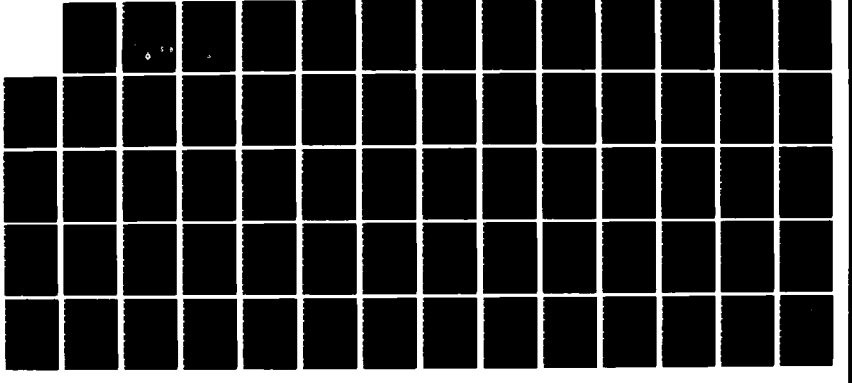

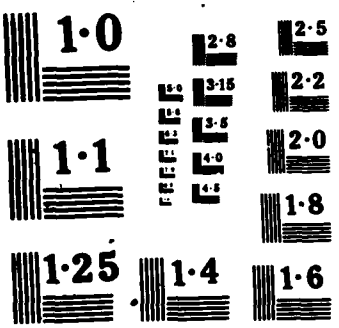

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SWSPA - A COMPUTER PROGRAM PACKAGE FOR SEAKEEPING PERFORMANCE ASSESSMENT OF SWATH SHIPS

W.C.E. Nethercote

Defence Research Establishment Atlantic

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W.C.E. Nethercote

April 1986

Approved by B.F. Peters A/Director/Technology Division

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ABSTRACT

A computer program package for assessing the seakeeping performance of SWATH ships is described. This package is based on an existing ship motion computer program, SWATM2. The seakeeping performance analysis process is automated and combined with a recently-published North Atlantic wave data base. The resulting package performs the following functions:

(1) Computes ship motions for the entire range of sea conditions for a user-specified ocean area in the North Atlantic.

(2) Applies seakeeping criteria to compute seakeeping performance parameters, such as maximum sustainable speed and maximum effective speed, for each heading and sea condition.

(3) Averages the seakeeping performance parameters over all headings to obtain mean values for each sea condition.

(4) Obtains averages over all sea conditions by weighting each sea condition in accordance with the North Atlantic wave data base.

RESUMÉ

On décrit un ensemble de programmes d'ordinateur pour l'évaluation de la tenue à la mer des navires SWATH. Cet ensemble est basé sur un programme existant d'étude des mouvements des navires, le SWATH2. Le processus d'analyse de la tenue à la mer est automatisé et combiné à une base de données sur les vagues dans l'Atlantique-Nord publiée récemment. L'ensemble résultant de programmes exécute les fonctions suivantes:

(1) Il calcule les mouvements de navires pour toute la gamme des états de la mer dans une région de l'Atlantique-Nord spécifiée par l'utilisateur.

(2) Il applique des critères de tenue à la mer pour calculer des paramètres de la tenue à la mer comme la vitesse soutenable maximum et la vitesse vraie maximum pour chaque cap et chaque état de la mer.

(3) Il calcule une moyenne des paramètres de tenue à la mer pour l'ensemble des caps afin d'obtenir des valeurs moyennes pour chaque état de la mer.

(4) Il calcule des moyennes pour l'ensemble des états de la mer en pondérant chacun des états conformément à la base de données sur les vagues dans l'Atlantique-Nord.

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NOTATION

Mathematical Terms

E	effectiveness factor
E_ℓ	lateral acceleration effectiveness factor
E_o	overall effectiveness factor
E_r	roll effectiveness factor
E_v	vertical acceleration effectiveness factor
F_h	heading operational fraction
F_o	ocean area operational fraction
H	significant waveheight
HREF	reference significant waveheight
m_H	rms motion at waveheight H
m_{HREF}	rms motion at waveheight HREF
R	rms roll
R_c	roll non-linearity correction factor
T_o	wave modal period
V_E	ocean area average of maximum effective speed
V_e	maximum effective speed for a given heading and sea state
V_S	ocean area average of maximum sustainable speed
V_s	maximum sustainable speed for a given heading and sea state
VK	speed
X	rms motion

Program Variable Names

ALMX(I)	limiting lateral rms acceleration at station I
ALMAX	rms lateral acceleration for zero effectiveness
ALMIN	rms lateral acceleration for 100% effectiveness
AVMX(I)	limiting vertical rms acceleration at station I
AVMAX	rms vertical acceleration for zero effectiveness
AVMIN	rms vertical acceleration for 100% effectiveness
BXCL	box clearance
COSBET	cosine of heading angle

DEPCAT	dummy variable
DRST	draft
EXPMAX	machine dependent floating underflow/overflow criterion
FREEB	freeboard
H(I)	ith significant waveheight in ocean area
HREF	significant waveheight for responses given in SCSMOT.DAT
ICHECK	execution control integer
IEQ	exciting force and equation of motion output control integer
IFIN	ship motion control fin indicator
IMEAN	effectiveness array output control integer
IPRINT	PERF array file control integer
IREG	regular wave response output control integer
ISAVE	naked hull added mass and damping method control integer
ITERM	batch/interactive control integer
JJ	sea state index
LX	added mass and damping file control integer
MM	sea direction index
NBTA	number of headings
NFN	number of Froude numbers
NSEA	number of wave periods
NSTR	number of stations
NUM	number of waveheights in ocean area
NUN	units designator (British/Metric)
PB(JS,K)	probability of sea state occurence at waveperiod, JS, and waveheight, K
PDW	probability limit for relative motions, typically deck wetness or box impact
PITCH	limiting valve of rms pitch
RBMHT	height above still waterline
RBMST	station number
RMAX	rms roll angle for zero effectiveness

RMIN	rms roll angle for 100% effectiveness
ROCORR	roll non-linearity correction factor
ROLL	limiting valve of rms roll
SD	dummy variable
SINBET	sine of heading angle
SP	ship speed, knots
SPREAD	spectral spreading angle
TSW	wave period
VVMX(I)	limiting vertical velocity at station I
WANG	heading angle
ZPOS	height above centre of gravity

1. INTRODUCTION

Computer programs for predicting ship motions in waves have come into common use during the past decade. First to see widespread use were programs to predict vertical plane motions (pitch and heave) in head seas and hence such motion-related phenomena as slamming and deck wetness. More recently, programs which compute lateral motions (sway, roll and yaw), as well as vertical motions, at any heading to the sea, have become available; an example is DREA's SWATM2[1] program, which performs such calculations for SWATH (Small Waterplane Area Twin Hull) ships.

SWATM2 is structured to perform comprehensive ship absolute and relative motion computations for up to ten sea states on a single computer run. Using these ouputs, one can make a comprehensive assessment of ship seakeeping performance for the specified sea states. Unfortunately, manual analysis of SWATM2's output can be very time-consuming, particularly when many seakeeping parameters must be considered together with many combinations of sea state, heading and speed. Automation of this analysis is highly desirable.

The selection of appropriate sea states for seakeeping performance analysis is itself of much importance. This choice should be based on sea state statistics for the ocean areas of primary operational importance to the ship under consideration. Until recently, statistical data of this nature have been rather limited. The principal source has been Reference 2, which is based on visual observations made aboard ships of opportunity, with the attendant inevitable biases toward fine weather operation and particular trade routes. Also, visual observations of wave period are unreliable.

Because of the limitations of such sources of wave data as Reference 2, the U.S. Navy in 1975 initiated a project to develop a new wave and wind data base for the Northern Hemisphere using its Spectral Ocean Wave Model. This model takes wind field data as input, from which wave systems are predicted and followed as they propagate throughout the ocean basins. The model has roughly 2000 grid points throughout the Northern Hemisphere, and at each of these the propagated wave energies are summed to provide the local prediction. In the US Navy project, archived wind fields, based on measurements, are used to hindcast wave spectra at six-hour intervals for a period of 20 years (1959-1979). A description of the project is given in Reference 3.

In 1979, as part of the program of work of a NATO sub-group (NATO Naval Armaments Group, Information Exchange Group 6 on Ship Design, Sub-Group 5 on Seakeeping), the US Navy undertook to develop a source document for specifying wave and wind conditions for NATO operational areas, based largely on the twenty year hindcast project. This recently-published source document[4] provides a comprehensive and

accurate set of wave data for the North Atlantic; furthermore, the data are presented in a format very well suited to seakeeping performance assessment. Reference 4 is the basis for a recently-promulgated NATO Standardization Agreement[5] on wave and wind environment.

In Reference 4, the North Atlantic is divided into the ocean areas shown in Figure 1. For areas 00, 0, 1, 2, 4, 6, 7, 10, 11, 16 and 17 the following data are tabulated:

(1) significant wave height vs. modal wave period,
(2) significant wave height vs. wind speed,
(3) significant wave height vs. primary wave direction,
(4) wind speed vs. wind direction,
(5) persistence of significant wave height, and
(6) persistence of wind speed.

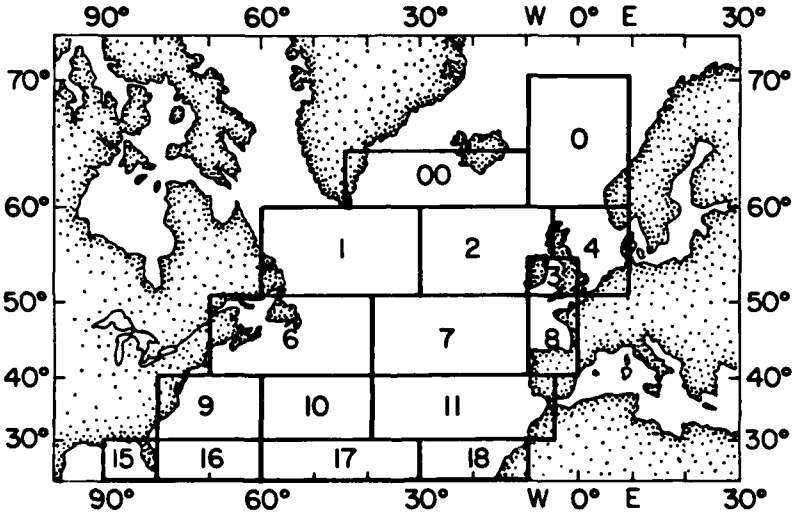

Figure 1: Definition of Representative Areas in the North Atlantic Basin

The tables of significant wave height vs. modal wave period are especially useful. The format is shown in Table 1, which gives annual percentage occurrence of wave height as a function of wave period, averaged over the entire North Atlantic (i.e. all the ocean areas shown in Figure 1). From this table, one can select the appropriate sea conditions (combinations of wave height and period) for performing sea-keeping performance assessments for ships operating in the North Atlantic. Also, percentages given in Table 1 can be used to weight the results computed for particular sea conditions, in order to obtain over-all estimates of performance.

The usefulness of automating the seakeeping analysis process has already been mentioned. Combining this automated analysis with the North Atlantic wave data of Reference 4, as exemplified by Table 1, obviously would result in a very useful tool. The concept thus emerges of a computer program which would perform the following operations:

(1) compute ship motions for each of the wave height-period combinations in Table 1 for which percentage occurrence > 0, covering a full range of speed and heading for each;

(2) apply seakeeping criteria to compute seakeeping performance parameters (such as maximum sustainable speed) for each heading and sea condition; and

(3) obtain averages of seakeeping performance parameters over all sea conditions by weighting each sea condition in accordance with Table 1.

This technical memorandum describes such a computer program for SWATH ships.

2. DEFINITION OF KEY SEAKEEPING PERFORMANCE PARAMETERS

In assessing a ship's seakeeping performance, the goal is to establish how ship motions and related phenomena affect operational capability. Hence one must compute such parameters as: maximum sustainable speed, maximum effective speed, crew effectiveness factors (as a function of ship motions), and fraction of sea conditons for which specified ship operations can be performed without exceeding ship motion limits. The seakeeping performance parameters used herein are defined below.

Sustainable speed, V_S, is the maximum speed which a ship can maintain on a given heading in a given seaway without exceeding specified limits on slamming, deck wetness and motions (roll, pitch, vertical velocity and acceleration, and lateral velocity and acceleration).

Effectiveness factor, E, accounts for the degradation in crew performance as a result of ship motion. Let X be the root mean square (rms) value of a ship motion known to affect crew performance significantly. Then, for given speed, heading and sea condition, the associated effectiveness factor E is computed using the following equation:

$$E = \begin{cases} 100 & X \leq X_{MIN} \\ 100[1 - (X - X_{MIN})/(X_{MAX} - X_{MIN})] & X_{MIN} < X < X_{MAX} \\ 0 & X \geq X_{MAX} \end{cases} \qquad (1)$$

That is, effectiveness is assumed to be 100% for rms values below X_{MIN}, 0% for values above X_{MAX}, and to vary linearly in between, as illustrated in Figure 2. Four types of effectiveness factors are defined: vertical acceleration, E_v; lateral acceleration, E_ℓ; roll angle, E_r; and the overall effectiveness factor, E_o, which is the minimum of E_v, E_ℓ, and E_r.

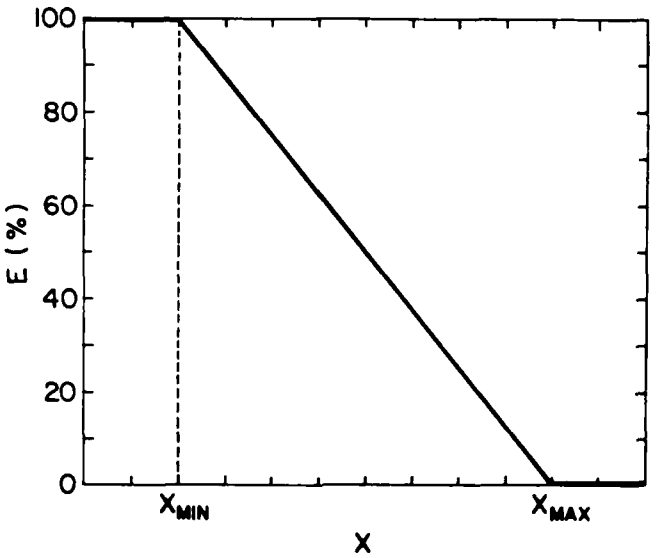

Figure 2: Effectiveness Factor

For a given heading and sea condition, effective speed, V_e, is the maximum speed which a ship can maintain with acceptable effectiveness, i.e. $E_o \geq$ EFFMIN, where EFFMIN is a user-specified minimum acceptable level of effectiveness (say 70%).

For a given speed and sea condition, heading operational fraction, F_h is the fraction of all possible headings for which limits on slamming, deck wetness and motions are not exceeded and $E_o \geq$ EFFMIN.

For a given speed and ocean area, ocean area operational fraction, F_o is the fraction of headings and sea conditions for which limits on slamming, deck wetness and motions are not exceeded and $E_o \geq$ EFFMIN. Thus the ocean area operational fraction is the heading operational fraction averaged over all possible sea conditions for the specified ocean area.

3. SWATH PACKAGE FOR SEAKEEPING PERFORMANCE ASSESSMENT

3.1 General Computational Procedure

To accomplish the SWATH seakeeping performance assessment, a package has been developed consisting of four programs:

(1) SWATM2 is used to check ship input data and to compute factors to compensate for roll non-linearities;

(2) SWPA calculates motions in long-crested seas and generates a data file of rms motions for a user-specified speed range (typically 5-30 knots at 5 knot intervals), a number of headings (typically 13, 0° to 180° at 15° intervals), and a number of wave modal periods (typically 13). A typical case of 6 speeds and 13 headings and modal periods gives 1014 speed/heading/period combinations;

(3) CONVER uses the data file generated by SWPA to calculate rms motions in short-crested seas for the same speed/heading/period combinations as generated by SWPA; and

(4) SWSPA - SWATH Seakeeping Performance Assessment - uses the rms motion data file generated by CONVER to compute ship motions at each speed and heading for each wave height-period combination for which probability of occurence is greater than two in the specified ocean area.

Taking the case given in Table 1 as an example, with 6 speeds and 13 headings there will be 6*13*78 = 6084 combinations of speed, heading and sea condition. SWSPA then applies seakeeping criteria to compute the seakeeping performance parameters defined in Section 2. These are then averaged over all headings to obtain mean values for each sea condition. Finally, averages over ocean area are computed by weighting each sea condition in accordance with its percentage of occurrence. The format of the resulting output is illustrated in Table 2.

3.2 Use and Limitations of Linear Superposition

Linear superposition is a basic assumption of all linear seakeeping theories: quite simply, motions are assumed to be proportional to waveheight. Fortunately, at moderate waveheights the linearity assumption is generally acceptable for all motions except roll, where an artifice is generally employed to account for non-linear viscous roll damping.

Typically, linear strip theory computer programs replace non-linear damping by an equivalent linear damping term which dissipates the same amount of energy in one roll cycle. Knowledge of roll angle is required for the linearization so an iterative solution to the damping and predicted roll angle may be necessary.

In the SWSPA package, SWPA and CONVER assume linearity and calculate irregular seas responses for one significant waveheight to save file space. When the final program, SWSPA, is used a correction is necessary for roll non-linearity.

Roll damping has linear and quadratic components so that a quadratic relationship between rms roll, R, and waveheight, H, can be assumed as shown in Figure 3.

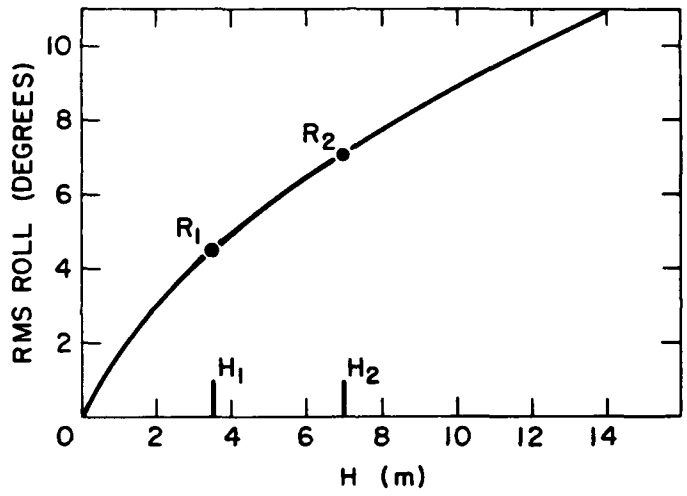

Figure 3: Quadratic form of R vs H for a typical case.

A roll non-linearity correction factor, R_C, can be defined as

$$R_C = R_2/R_1 \qquad (2)$$

where R_1 is rms roll angle in irregular beam seas of significant height HREF;

and R_2 is rms roll angle in irregular beam seas of significant height 2 X HREF

The quadratic relationship of R and H

$$aR^2 + bR + H = 0 \qquad (3)$$

can be rewritten as

$$R = [-b + (b^2 + 4\ aH)^{1/2}]/(2a) \qquad (4)$$

where it can be shown that

$$a = [HREF/(R_c^2 R_1)](2 - R_c)/(R_c - 1) \qquad (5)$$

and $$b = (HREF - a^2\ R_1)/R_1 \qquad (6)$$

So, R_c is derived from the initial SWATH2 run and is used in equations (3) to (5) to determine roll angles in SWSPA.

3.3 SWPA

SWPA is a modified version of SWATM2. The principal change is to output, where a computer disk file of rms motions is stored for later use by CONVER.

The input to SWPA differs from that of SWATM2 in only one respect: it is possible to specify that the program output the basic hull added mass and damping coefficients to a file which can be used by later program executions in lieu of calculation of these coefficients.

A simplified flow chart for SWPA is given in Figure 4; it is essentially the same as for SWATM2.

SWPA calculates the following rms motions in unidirectional seas:

(1) roll,
(2) pitch,
(3) vertical relative motion at up to 15 stations,
(4) vertical relative velocity at up to 15 stations,
(5) vertical acceleration at up to 15 stations,
(6) lateral acceleration at up to 15 stations.

As the program cycles through the speed, heading and T_o loops, the rms motions are written on the file PPNAME, the structure of which is given in Table 3. The number of records in PPNAME is five per speed/period/heading combination. For example, for 6 speeds, 13 periods and 13 headings this corresponds to 5x6x13x13 = 5070 records. For 4 stations, then, the total number of words is 18252.

SWPA also generates the file SHORT.DAT, described in Table 4. The FORTRAN variable names in Table 4 are defined in the Nomenclature.

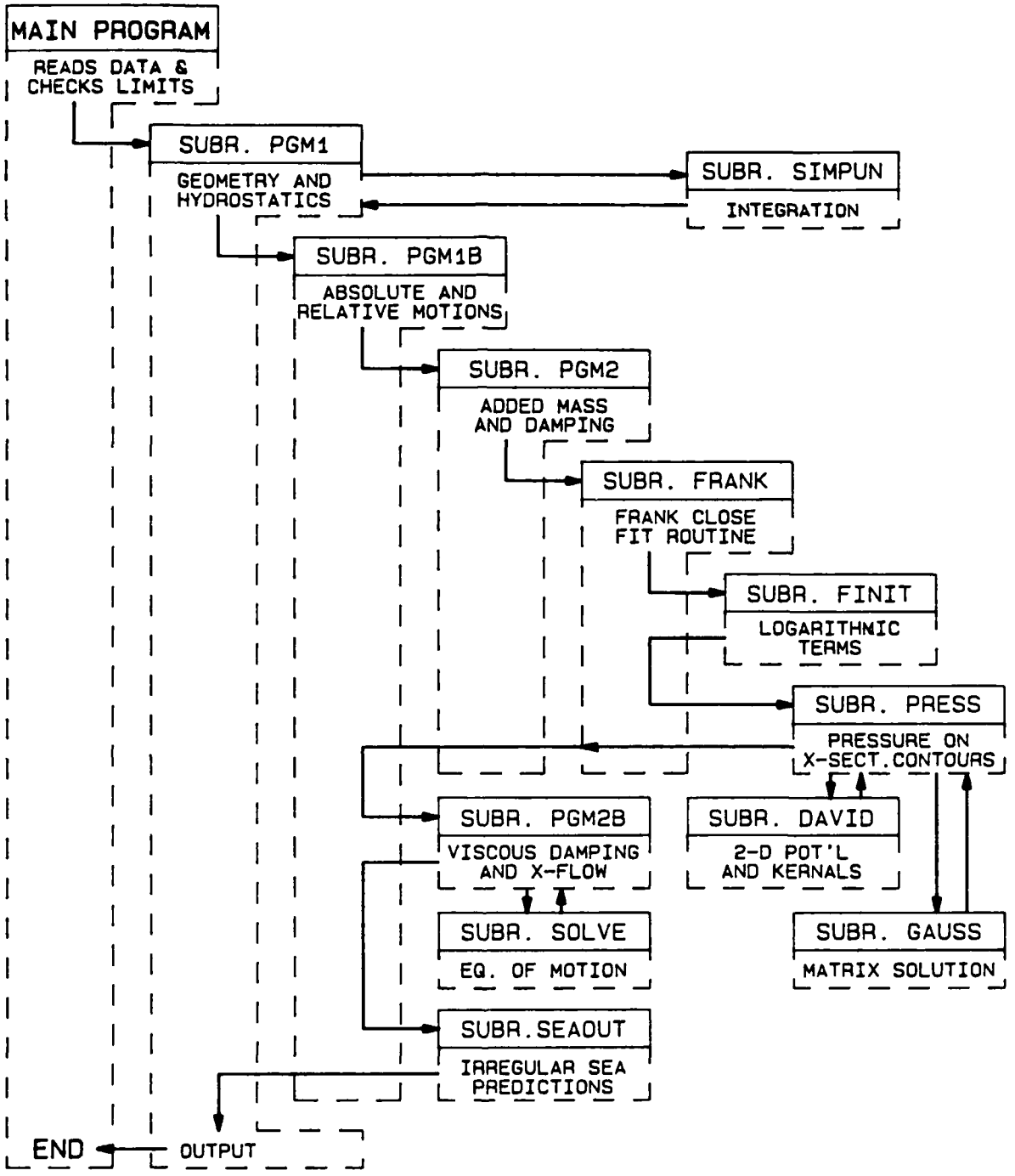

Figure 4: SWPA Flow Chart

3.4 CONVER

CONVER is the computer program which converts the unidirectional sea rms motions in the file PPNAME to short-crested rms motions stored in file SCSMOT.DAT.

In addition to PPNAME, CONVER requires the file SHORT.DAT whose structure is given in Table 4.

Program CONVER consists of the irregular multidirectional sea, subroutines extracted from SWATM2. The spectral options offered by SWATM2 are retained.

Like SWPA, CONVER writes data for each speed/heading/period combination in the computer disk files RMS and RMSX, with each complete combination being appended to SCSMOT. The rms and rmsx structure remains as given in Table 4. The format of SCSMOT is as for PPNAME, as given in Table 3.

3.5 SWSPA

SWSPA is the computer program that takes as input user-specified seakeeping criteria, reads the rms motion data file generated by CONVER, and then performs the seakeeping assessment. A flow chart for SWSPA is given in Figure 5.

The input to SWSPA is as follows:

(1) rms responses to short crested seas given in SCSMOT.DAT;

(2) ocean area probability data in the file SEADAT.DAT;

(3) roll non-linearity corrections in the file SHORT.DAT;

(4) limits on motions, whether as pitch or roll or accelerations or relative motions at particular stations, given in CKEEP.DAT.

Records 20 and 21 of SHORT.DAT (see Table 4) are user appended variables and are only used by SWSPA. The variable definitions are:

(1) SP: ship speed in knots, and
(2) ROCORR: roll non-linearity correction factor, R_c.

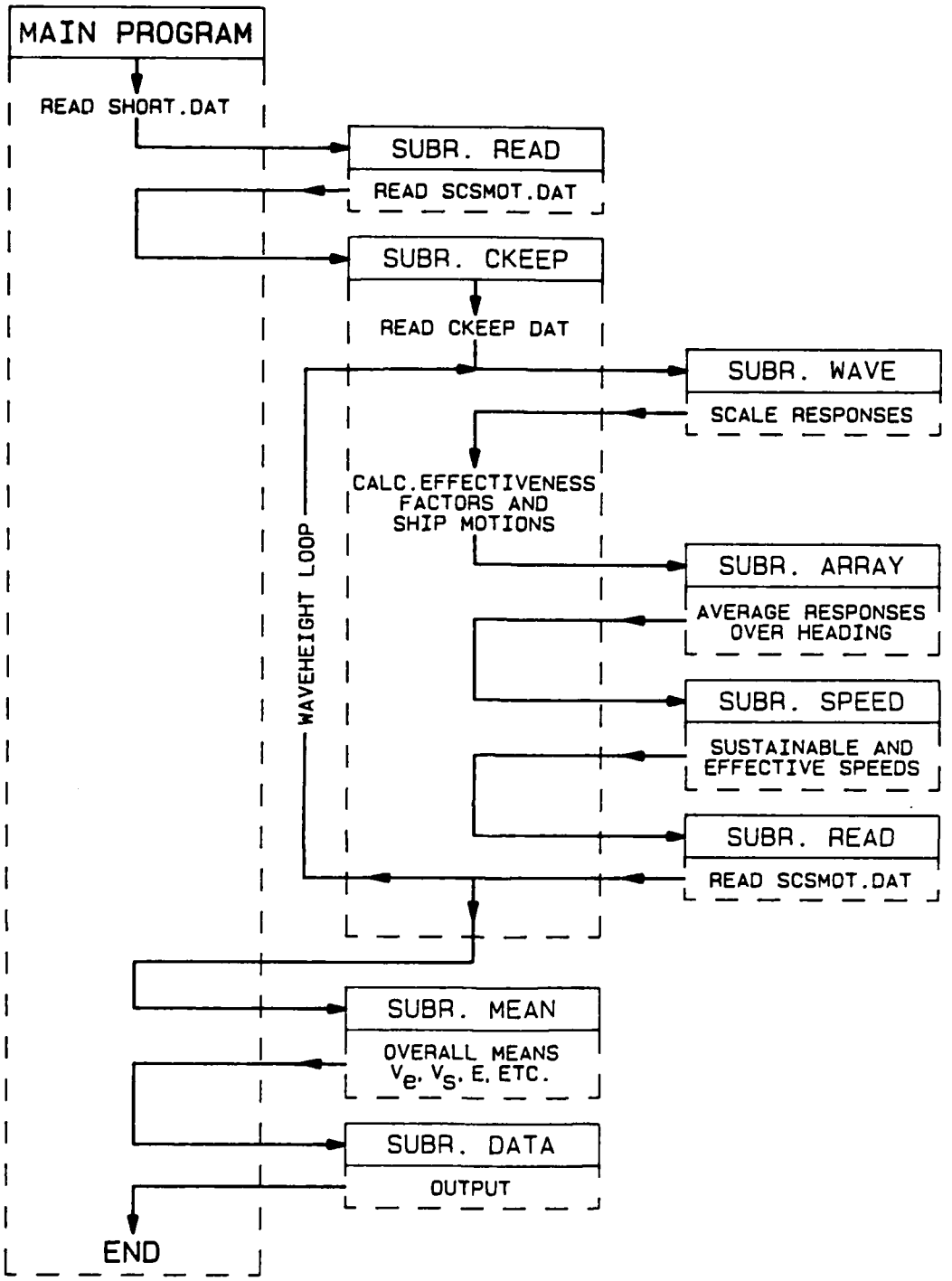

Figure 5: SWSPA Flow Chart

CKEEP.DAT specifies both program controls and response limits. Table 5 gives the file structure. FORTRAN definitions are given in the Nomenclature.

SEADAT.DAT contains the annual percentage occurrence of sea state data, there being NSEA records, each for one wave period. Each record has 13 entries, each corresponding to a waveheight.

3.6 Use of the SWSPA Package

The User's Manual for the SWSPA package is given in Appendix A, and a sample case is given in Appendix B.

The files generated by the SWSPA package are particularly large and users may encounter system account difficulties if several cases are run consecutively without first deleting or archiving files from earlier runs. Similarly, execution times may require running cases in batch mode: on DREA's DEC-20, SWPA runs are aborted by the operating system if the user attempts to run cases interactively.

4. CONCLUDING REMARKS

A computer program package has been developed for the seakeeping performance assessment of SWATH ships. This package, given the name SWSPA (SWATH Seakeeping Performance Assessment) is based on an existing ship motion computer program, SWATM2, and a recently published North Atlantic data base. SWSPA consists of four programs:

SWATM2 is used to check input data and to compute factors to compensate for roll non-linearities.

SWPA uses the data file to generate a data file of rms motions in long-crested irregular waves for a user specified speed range, number of headings to the seas, (typically 13), and number of modal wave periods (typically 13).

CONVER uses the rms motions calculated by SWPA and calculates rms motions in multi-directional seas with a user specified spreading angle.

SWSPA uses the multi-directional motions data, together with specified ocean area data and then applies seakeeping criteria to compute such seakeeping performance parameters as sustainable speed and effective speed. These are then averaged over headings to obtain mean values for each sea condition. Finally, averages

over all sea conditions for the specified ocean area are computed by weighting each sea condition in accordance with its percentage of occurrence. An important output is the ocean area operatonal fraction, which, for a given speed, is the fraction of headings and sea conditions for which limits on slamming, deck wetness and motions are not exceeded and operational effectiveness is acceptable.

A user's manual for SWSPA has been presented, including descriptions of program structure, input and output. Input and output examples have also been given.

TABLE 1: SIGNIFICANT WAVE HEIGHT BY MODAL WAVE PERIOD - ANNUAL PERCENTAGE OCCURRENCE IN THE NORTH ATLANTIC

SIGNIFICANT WAVEHEIGHT (H)	3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
13.0												.1	
11.0											.2	.2	
9.5										.1	.2	.1	
8.5									.2	.5	.2	.2	
7.5								.2	.6	.6	.3	.2	
6.5								1.0	.8	.7	.3	.2	
5.5							.5	2.3	1.0	.8	.4	.2	
4.5						.5	2.4	2.6	1.0	.8	.4	.2	.1
3.5					.6	3.5	3.0	2.6	1.1	.8	.5	.3	.1
2.5				1.7	4.2	4.4	2.9	2.3	1.2	1.0	.6	.3	.1
1.5		.2	3.0	5.1	4.2	4.1	2.8	2.6	1.2	1.3	.7	.4	.1
0.5	.4	.3	4.2	4.3	3.0	3.7	2.0	2.0	.9	1.0	.5	.2	

MODAL WAVE PERIOD (SEC)

TABLE 2: OVERALL SEAKEEPING PERFORMANCE FOR NORTH ATLANTIC OCEAN

OVERALL SEAKEEPING PERFORMANCE

MEAN SUSTAINABLE SPEED = 30.0

MEAN EFFECTIVE SPEED = 29.30

SPEED (KT)	EFFECTIVENESS FACTORS (PERCENT) VERT. ACC.	LAT. ACC	ROLL	OVER-ALL	FRACTION
5.0	99.7	91.1	100.0	91.1	.937
10.0	99.7	91.5	100.0	91.5	.942
15.0	99.6	92.1	100.0	92.1	.952
20.0	99.6	92.7	100.0	92.7	.964
25.0	99.5	93.3	100.0	93.3	.970
30.0	99.4	93.9	100.0	93.9	.977

TABLE 3: STRUCTURE OF FILE PPNAME IN SWATH PACKAGE

Record Number	
1 - 5	motion block for JS = 1, MM = 1
6 - 10	2
11 - 15	3
16 - 20	4
21 - 25	5
26 - 30	6
31 - 35	7
36 - 40	8
41 - 45	9
46 - 50	10
51 - 55	11
56 - 60	12
61 - 65	13
66 - 130	motion blocks for JS = 2, MM = 1 - 13
131 - 195	3
196 - 260	4
261 - 325	5
326 - 390	6
391 - 455	7
456 - 520	8
521 - 585	9
586 - 650	10
651 - 715	11
716 - 780	12
781 - 845	13

Note: (1) An individual motion block consists of 5 records with the following data:

Record 1 pitch and roll;
Record 2 relative motion at specified stations;
Record 3 relative velocity at specified stations;
Record 4 vertical acceleration at specified stations; and
Record 5 lateral acceleration at specified stations.

(2) This table applies to one speed and four specified stations.

(3) JS is the sea state index, JS=1, no. of periods. MM is the sea direction index, MM=1, no. of headings.

TABLE 4: STRUCTURE OF FILE SHORT.DAT

RECORD OF CONTENTS

Record Number	
1.	spread, NFN, NSTR, NBTA, NSEA, DEPCAT, SD, EXPMAK, NUN.
2.	SINBET, COSBET, WANG for first heading.
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	
12.	
13.	
14.	SINBET, COSBET, WANG for thirteenth heading.
15.	RBMST, RBMHT, FREEB, BXCL, DRST, ZPOS for first station.
16.	
17.	
18.	RBMST, RBMHT, FREEB, BXCL, DRST, ZPOS for fourth station.
19.	TSW(LL), LL = 1, NSEA.
20.	SP(JJ), JJ = 1, NFN.
21.	ROCORR(JJ), JJ = 1, NFN.

Note: This table applies to 13 headings and 4 stations. Records 20, 21 are user appended to file.

TABLE 5: STRUCTURE OF FILE CKEEP.DAT

Record Number	RECORD OF CONTENTS
1	HREF
2	ITERM, IPRINT, IMEAN
3	PDW, PITCH, ROLL
4-(NSTR+3)	AVMX(I), ALMX(I)
NSTR+4	AVMAX, AVMIN, ALMAX, ALMIN, RMAX, RMIN
NSTR+5	EFFMIN
NSTR+6	NUM
NSTR+7	H(I), I+1, NUM

APPENDIX A: USER'S MANUAL FOR THE SWSPA PACKAGE

A.1 Input

A.1.1 SWATM2

SWATM2 is used in the SWSPA package in order to check input data and to enable calculation of roll non-linearity correction factors for inclusion in the file SHORT.DAT and use by the program SWSPA.

For data checking, SWATM2 may be run simply to output the input data by setting the variable ICHECK in record 2 equal to 1 (see Reference 1). A zero value of ICHECK allows program execution.

To generate data for calculation of roll non-linearity correction factors, a run (or runs as SWATM2 is limited to four speeds out of consideration of file size) is made for beam seas (β = 90 degrees) with significant waveheights of HREF and 2 X HREF. The appropriate wave spectrum is specified and a suitable value of T_o for the two waveheights is selected.

Appendix B includes a SWATM2 input example, together with the corresponding output.

A.1.2. SWPA

Input requirements for SWPA differ little from SWATM2, so only those input records differing from SWATM2 will be described.

Record (2), 7 integers

IFIN: IFIN = 0 = > ship has no motion control fins.
IFIN = 1 = > ship has fins.

NUN: NUN = 1 = > British units input and output.
NUN = 2 = > Metric units input and output.

LX: controls output of naked hull added mass and damping coefficients.
LX = 0 = > no output of coefficients.
LX = 0 = > coefficients output to disc file HULL.DAT.
LX = 2 = > coefficients output to line printer.

IEQ: controls output of equation of motions solved, exciting forces and damping coefficients.
IEQ = 0 = > no output.
IEG = 1 = > output to line printer.

IREG: IREG = 0 = > no output of regular wave responses.
IREG = 1 = > output of regular wave responses to line printer.

ICHECK: execution control.
ICHECK = 0 = > normal program execution.
ICHECK = 1 = > printout of input data with further execution suppressed.

ISAVE: ISAVE = 0 = > program calculates naked hull added mass and damping coefficients.
ISAVE = 1 = > program reads naked hull added mass and damping coefficients from file HULL.DAT.

Record 3 is the same as for SWATM2, but the maximum allowable value for NFN is increased to 6 from 4.

Note that in Records 15 and 18, it is necessary to input NSEA sea states, each of HREF height, with various periods, generally 13 in number. Similarly, although SWPA is a long-crested sea model, the spreading angle called for in record 17 must be input. This number is simply output to SHORT.DAT for eventual use by the program CONVER.

A typical example of input is given in Appendix B.

There are two output files generated by SWPA: SHORT.DAT and PPNAME. Examples corresponding to the preceeding input are given in Appendix B.

A.1.3 CONVER

No data, other than SWPA output is required to run CONVER. Output is the file SCSMOT.DAT, an example of which is shown in Appendix B.

A.1.4 SWSPA

Input required by SWSPA is comprised of a number of files. One of these, SCSMOT.DAT, is produced by CONVER in a ready to use state.

SHORT.DAT

The bulk of SHORT.DAT is produced by SWPA, but the last two records are user appended:

penultimate record/NFN reals:

SP(JJ) speeds (in knots) corresponding to the Froude numbers specified in SWPA.

last record, NFN reals

ROCORR(JJ) roll non-linearity correction factor, R_c, in equation (2), Section 3.2.

CKEEP.DAT

The format of file CKEEP.DAT has already been described in detail.

SEADAT.DAT

SEADAT.DAT is a 13 X 13 matrix of waveheight-period combination probabilities, with records as follows:

record 1, 13 reals: K = 1

PB(JS,K) JS = 1, 13, with PB(JS, 1)being the probability of occurrence of a wave period (JS index) at the first waveheight required.

records 2-13, 13 reals: K = 2-13

PB(JS,K) probabilities for subsequent waveheights.

A.2 Output

Output for SWATM2 has been adequately described elsewhere and will not be described here, other than by reference to Appendix B.

The various files created by programs SWPA and CONVER have already been described. They are not output by the programs, but may be printed by the user if required.

The output of SWSPA is controlled by the file CKEEP.DAT. The integer IPRINT would normally be set to zero to suppress the writing of the array PERF on file CHECK.DAT. Appendix B shows an example of this array. The integer IMEAN, set to zero, writes both effectiveness arrays and the performance summary onto a file OUTPUT.DAT, as shown in Appendix B. Setting IMEAN to 1 will allow the writing to OUTPUT.DAT of only the performance summary, as shown in Table 2.

APPENDIX B: SAMPLE INPUTS AND OUTPUTS FOR THE SWSPA PACKAGE

The example given herein calculates the performance of a 4921 ton (5000 tonne) SWATH frigate in North Atlantic conditions, as given in Table 1.

The first input and output listings, labelled Annex 1 and Annex 2, are for SWATM2 at three of the six speeds (5, 10, ..., 30 kt) specified and are used to calculate the variable ROCORR, as below:

Speed, kt:	5	10	15	20	25	30
ROCORR	1.371	1.361	1.351	1.348	1.338	1.326

The third listing, Annex 3, is the input file for SWPA. This is followed by an abbreviated version of the output file PPNAME, Annex 4. The full listing of PPNAME in this case would take 84 line-printer pages. Annex 5, SHORT.DAT, is also produced by SWPA, but in this case is shown with the user appended variables, SP and ROCORR, added.

The sixth listing, Annex 6, is an abbreviated version of SCSMOT.DAT, the output file from the program CONVER. This file's format is as for PPNAME, but the data are for short-crested rather than long-crested seas.

Annexes 7 and 8 are the user-typed files SEADAT.DAT and CKEEP.DAT, which define ocean area probabilities and motions limits respectively. These files are required, together with SCSMOT.DAT and SHORT.DAT, as input to SWSPA.

The final listing, Annex 9, gives the output file from SWSPA. In this particular case, with the limits selected, mean sustainable and effective speeds are both very high, 30.0 and 29.30 knots respectively. These high speeds are typical of SWATH ships. A typical monohull might have mean sustainable and effective speeds of 27.0 and 23.7 knots.

```
SWATH OPTION C4(2): 4921 TON FFH
 1    1    0    0    0    0
25    7    3   25    6   30    3
 0.5    3.0
 0.0   30.0   60.0   90.0  120.0  150.0  180.0
 0.46940    0.53834    0.58728
41.11
-0.8990   -0.4322    4.3221   11.3000   15.8620   18.6282
 6.30      6.30      6.30      6.30      6.30      6.30
231.37     0.321     0.35     11.30     -6.30     11.10    19.06
 20.0     27.24     19.06      9.25     11.50      1.50     4.50    1.20
227.0     22.36     19.06     15.75     19.50      1.50     4.50    1.20
  0.5      0.07
 1
 3
60.0
 9.84    8.94
16.40    9.74
22.97   10.39
40.50   18.50
40.50   18.50
40.50   18.50
40.50   18.50
40.50   18.50
40.50   18.50
-2.5    7    0
-2.0    7    0
-1.0    7    0
 0.0    7    0
 1.0   11    0
 2.0   11    0
 3.0   11    0
 4.0   11    0
 5.0   11    0
 6.0   11    0
 7.0   11    0
 8.0   11    0
 9.0   11    2
10.0   11    1
11.0   11    1
12.0   11    0
13.0   11    0
14.0   11    0
15.0   11    0
16.0   11    0
17.0   11    0
18.0   11    0
19.0   11    0
20.0    7    0
21.0    7    0
22.0    7    0
23.0    7    0
24.0    7    0
25.0    7    0
26.0    7    0
```

SWATM2 INPUT (1 of 2)

```
 0.00 -2.60 -2.60  0.00  2.60  2.60  0.00
12.55 11.05  8.05  6.55  8.05 11.05 12.55
 0.00 -5.63 -5.63  0.00  5.63  5.63  0.00
16.05 12.80  6.30  3.05  6.30 12.80 16.05
 0.00 -7.90 -7.90  0.00  7.90  7.90  0.00
18.68 14.12  4.99  0.43  4.99 14.12 18.68
 0.00 -8.05 -8.05  0.00  8.05  8.05  0.00
18.85 14.20  4.98  0.25  4.98 14.20 18.85
-2.50 -2.50 -2.50 -8.19 -7.03  0.00  7.03  8.19  2.50  2.50  2.50
28.61 23.22 17.83 12.34  4.51  0.98  4.51 12.34 17.83 23.22 28.61
-3.10 -3.10 -3.10 -7.85 -6.45  0.00  6.45  7.85  3.10  3.10  3.10
28.61 22.84 17.07 11.66  4.61  1.43  4.61 11.66 17.07 22.84 28.61
-3.55 -3.55 -3.55 -7.93 -6.35  0.00  6.35  7.93  3.55  3.55  3.55
28.61 22.74 16.86 11.35  4.48  1.43  4.48 11.35 16.86 22.74 28.61
-3.90 -3.90 -3.90 -7.98 -6.26  0.00  6.26  7.98  3.90  3.90  3.90
28.61 22.65 16.68 11.09  4.38  1.43  4.38 11.09 16.68 22.65 28.61
-4.10 -4.10 -4.10 -8.01 -6.21  0.00  6.21  8.01  4.10  4.10  4.10
28.61 22.59 16.57 10.94  4.32  1.43  4.32 10.94 16.57 22.59 28.61
-4.30 -4.30 -4.30 -8.03 -6.16  0.00  6.16  8.03  4.30  4.30  4.30
28.61 22.53 16.45 10.78  4.26  1.43  4.26 10.78 16.45 22.53 28.61
-4.38 -4.38 -4.38 -8.04 -6.15  0.00  6.15  8.04  4.38  4.38  4.38
28.61 22.51 16.40 10.73  4.24  1.43  4.24 10.73 16.40 22.51 28.61
-4.45 -4.45 -4.45 -8.05 -6.13  0.00  6.13  8.05  4.45  4.45  4.45
28.61 22.48 16.35 10.67  4.22  1.43  4.22 10.67 16.35 22.48 28.61
-4.50 -4.50 -4.50 -8.05 -6.11  0.00  6.11  8.05  4.50  4.50  4.50
28.61 22.47 16.32 10.63  4.20  1.43  4.20 10.63 16.32 22.47 28.61
-4.50 -4.50 -4.50 -8.05 -6.11  0.00  6.11  8.05  4.50  4.50  4.50
28.61 22.47 16.32 10.63  4.20  1.43  4.20 10.63 16.32 22.47 28.61
-4.50 -4.50 -4.50 -8.05 -6.11  0.00  6.11  8.05  4.50  4.50  4.50
28.61 22.47 16.32 10.63  4.20  1.43  4.20 10.63 16.32 22.47 28.61
-4.45 -4.45 -4.45 -8.05 -6.13  0.00  6.13  8.05  4.45  4.45  4.45
28.61 22.48 16.35 10.67  4.22  1.43  4.22 10.67 16.35 22.48 28.61
-4.25 -4.25 -4.25 -8.03 -6.18  0.00  6.18  8.03  4.25  4.25  4.25
28.61 22.55 16.48 10.82  4.28  1.43  4.28 10.82 16.48 22.55 28.61
-4.00 -4.00 -4.00 -7.99 -6.24  0.00  6.24  7.99  4.00  4.00  4.00
28.61 22.62 16.63 11.01  4.35  1.43  4.35 11.01 16.63 22.62 28.61
-3.70 -3.70 -3.70 -7.95 -6.31  0.00  6.31  7.95  3.70  3.70  3.70
28.61 22.70 16.79 11.24  4.44  1.43  4.44 11.24 16.79 22.70 28.61
-3.25 -3.25 -3.25 -7.87 -6.41  0.00  6.41  7.87  3.25  3.25  3.25
28.61 22.81 17.00 11.56  4.57  1.43  4.57 11.56 17.00 22.81 28.61
-2.70 -2.70 -2.70 -7.77 -6.53  0.00  6.53  7.77  2.70  2.70  2.70
28.61 22.92 17.22 11.94  4.73  1.43  4.73 11.94 17.22 22.92 28.61
-2.00 -2.00 -2.00 -7.61 -6.68  0.00  6.68  7.61  2.00  2.00  2.00
28.61 23.02 17.43 12.40  4.92  1.43  4.92 12.40 17.43 23.02 28.61
-1.18 -1.18 -1.18 -7.85 -7.29  0.00  7.29  7.85  1.18  1.18  1.18
28.61 23.37 18.12 13.18  4.89  0.90  4.89 13.18 18.12 23.37 28.61
 0.00 -8.05 -8.05  0.00  8.05  8.05  0.00
18.85 14.20  4.98  0.25  4.98 14.20 18.85
 0.00 -8.12 -8.12  0.00  8.12  8.12  0.00
18.92 14.23  4.86  0.17  4.86 14.23 18.92
 0.00 -7.49 -7.49  0.00  7.49  7.49  0.00
18.20 13.88  5.23  0.90  5.23 13.88 18.20
 0.00 -6.52 -6.52  0.00  6.52  6.52  0.00
17.08 13.32  5.79  2.03  5.79 13.32 17.08
 0.00 -5.00 -5.00  0.00  5.00  5.00  0.00
15.32 12.43  6.66  3.77  6.66 12.43 15.32
 0.00 -2.86 -2.86  0.00  2.86  2.86  0.00
12.85 11.20  7.90  6.25  7.90 11.20 12.85
 0.00 -0.09 -0.09  0.00  0.09  0.09  0.00
 9.65  9.00  9.50  9.45  9.50  9.00  9.65
```

SWATM2 INPUT (2 of 2)

```
SWATMO   SHIP MOTIONS OF SWATH OPTION C4(2): 4921 TON FFH                    PAGE   1
SYSTEM OF UNITS USED : BRITISH


 SWATH OPTION C4(2): 4921 TON FFH
    1    1    0    0    0    0
   25    7    3   25    6   30    3
   0.50000   3.00000
   0.00000  30.00000  60.00000  90.00000 120.00000 150.00000 180.00000
   0.48940   0.53834   0.58728
  41.11000
  -0.89900  -0.43220   4.32210  11.30000  15.86200  18.62820
   6.30000   6.30000   6.30000   6.30000   6.30000   6.30000
 231.37000   0.32100   0.35000  11.30000  -6.30000  11.10000  19.06000
  20.00000  27.24000  19.06000   9.25000  11.50000   1.50000   4.50000   1.20000
 227.00000  22.36000  19.06000  15.75000  19.50000   1.50000   4.50000   1.20000
   0.50000   0.07000
    1
    3
 60.0000
  9.8400   8.9400
 16.4000   9.7400
 22.9700  10.3900
  40.50000  18.50000
  40.50000  18.50000
  40.50000  18.50000
  40.50000  18.50000
  40.50000  18.50000
  40.50000  18.50000
  -2.5000       7       0
  -2.0000       7       0
  -1.0000       7       0
   0.0000       7       0
   1.0000      11       0
   2.0000      11       0
   3.0000      11       0
   4.0000      11       0
   5.0000      11       0
   6.0000      11       0
   7.0000      11       0
   8.0000      11       0
   9.0000      11       2
  10.0000      11       1
  11.0000      11       1
  12.0000      11       0
  13.0000      11       0
  14.0000      11       0
  15.0000      11       0
  16.0000      11       0
  17.0000      11       0
  18.0000      11       0
  19.0000      11       0
  20.0000       7       0
  21.0000       7       0
  22.0000       7       0
  23.0000       7       0
  24.0000       7       0
  25.0000       7       0
  26.0000       7       0
```

PARTIAL SWATM2 OUTPUT (1 of 7)

SWATM0 SHIP MOTIONS OF SWATH OPTION C4(2): 4921 TON FFH

STATION -2.5000

0.0000 -2.6000 -2.6000 0.0000 2.6000 2.6000 0.0000
12.5500 11.0500 8.0500 6.5500 8.0500 11.0500 12.5500

STATION -2.0000

0.0000 -5.6300 -5.6300 0.0000 5.6300 5.6300 0.0000
16.0500 12.8000 6.3000 3.0500 6.3000 12.8000 16.0500

STATION -1.0000

0.0000 -7.9000 -7.9000 0.0000 7.9000 7.9000 0.0000
18.6800 14.1200 4.9900 0.4300 4.9900 14.1200 18.6800

STATION 0.0000

0.0000 -8.0500 -8.0500 0.0000 8.0500 8.0500 0.0000
18.8500 14.2000 4.9000 0.2500 4.9000 14.2000 18.8500

STATION 1.0000

-2.5000 -2.5000 -2.5000 -8.1900 -7.0300 0.0000 7.0300 8.1900 2.5000 2.5000
2.5000
28.6100 23.2200 17.8300 12.3400 4.5100 0.9000 4.5100 12.3400 17.8300 23.2200
28.6100

STATION 2.0000

-3.1000 -3.1000 -3.1000 -7.8500 -6.4500 0.0000 6.4500 7.8500 3.1000 3.1000
3.1000
28.6100 22.8400 17.0700 11.6600 4.6100 1.4300 4.6100 11.6600 17.0700 22.8400
28.6100

•
•
•
•

STATION 19.0000

-1.1800 -1.1800 -1.1800 -7.8500 -7.2900 0.0000 7.2900 7.8500 1.1800 1.1800
1.1800
28.6100 23.3700 16.1200 13.1800 4.8900 0.9000 4.8900 13.1800 16.1200 23.3700
28.6100

STATION 20.0000

0.0000 -8.0500 -8.0500 0.0000 8.0500 8.0500 0.0000
18.8500 14.2000 4.9000 0.2500 4.9000 14.2000 18.8500

•
•
•
•

STATION 23.0000

0.0000 -6.5200 -6.5200 0.0000 6.5200 6.5200 0.0000
17.0800 13.3200 5.7900 2.0300 5.7900 13.3200 17.0800

STATION 24.0000

0.0000 -5.0000 -5.0000 0.0000 5.0000 5.0000 0.0000
15.3200 12.4300 6.6000 3.7700 6.6000 12.4300 15.3200

STATION 25.0000

0.0000 -2.8600 -2.8600 0.0000 2.8600 2.8600 0.0000
12.8500 11.2000 7.9000 6.2500 7.9000 11.2000 12.8500

STATION 26.0000

0.0000 -0.0900 -0.0900 0.0000 0.0900 0.0900 0.0000
9.6500 9.6000 9.5000 9.4500 9.5000 9.6000 9.6500

PARTIAL SWATM2 OUTPUT (2 of 7)

SWATMO SHIP MOTIONS OF SWATH OPTION C4(2): 4921 TON FFH

STATION	BEAM	DRAFT	AREA COEFFICIENT
-2.5000	0.0000	6.0000	0.7704
-2.0000	0.0000	13.0000	0.7699
-1.0000	0.0000	18.2500	0.7698
0.0000	0.0000	18.6000	0.7694
1.0000	5.0000	27.7100	1.9967
2.0000	6.2000	27.1800	1.5857
3.0000	7.1000	27.1800	1.4431
4.0000	7.8000	27.1000	1.3545
5.0000	8.2000	27.1000	1.3117
		•	
		•	
		•	
22.0000	0.0000	17.3000	0.7697
23.0000	0.0000	15.0500	0.7705
24.0000	0.0000	11.5500	0.7692
25.0000	0.0000	6.6000	0.7704
26.0000	0.0000	0.2000	0.0000

CRITICAL ENC. FREQ. FOR STATION -2.5000 = 0.0000
CRITICAL ENC. FREQ. FOR STATION -2.0000 = 0.0000
CRITICAL ENC. FREQ. FOR STATION -1.0000 = 0.0000
CRITICAL ENC. FREQ. FOR STATION 0.0000 = 0.0000
CRITICAL ENC. FREQ. FOR STATION 1.0000 = 12.0571
CRITICAL ENC. FREQ. FOR STATION 2.0000 = 10.8276
CRITICAL ENC. FREQ. FOR STATION 3.0000 = 10.1181
CRITICAL ENC. FREQ. FOR STATION 4.0000 = 9.6534
CRITICAL ENC. FREQ. FOR STATION 5.0000 = 9.4150
CRITICAL ENC. FREQ. FOR STATION 6.0000 = 9.1935
CRITICAL ENC. FREQ. FOR STATION 7.0000 = 9.1091
CRITICAL ENC. FREQ. FOR STATION 8.0000 = 9.0372
CRITICAL ENC. FREQ. FOR STATION 9.0000 = 8.9868
CRITICAL ENC. FREQ. FOR STATION 10.0000 = 8.9868
CRITICAL ENC. FREQ. FOR STATION 11.0000 = 8.9868
CRITICAL ENC. FREQ. FOR STATION 12.0000 = 9.0372
CRITICAL ENC. FREQ. FOR STATION 13.0000 = 9.2474
CRITICAL ENC. FREQ. FOR STATION 14.0000 = 9.5320
CRITICAL ENC. FREQ. FOR STATION 15.0000 = 9.9109
CRITICAL ENC. FREQ. FOR STATION 16.0000 = 10.5748
CRITICAL ENC. FREQ. FOR STATION 17.0000 = 11.6020
CRITICAL ENC. FREQ. FOR STATION 18.0000 = 13.4803
CRITICAL ENC. FREQ. FOR STATION 19.0000 = 17.5498
CRITICAL ENC. FREQ. FOR STATION 20.0000 = 0.0000
CRITICAL ENC. FREQ. FOR STATION 21.0000 = 0.0000
CRITICAL ENC. FREQ. FOR STATION 22.0000 = 0.0000
CRITICAL ENC. FREQ. FOR STATION 23.0000 = 0.0000
CRITICAL ENC. FREQ. FOR STATION 24.0000 = 0.0000
CRITICAL ENC. FREQ. FOR STATION 25.0000 = 0.0000
CRITICAL ENC. FREQ. FOR STATION 26.0000 = 0.0000

MINIMUM CRITICAL ENC. FREQ. = 0.0000 DUE TO STATION 26.0000

PARTIAL SWATM2 OUIPUT (3 of 7)

SWATMO SHIP MOTIONS OF SWATH OPTION C4(2): 4921 TON FFH

DATA FOR ONE HULL

LENGTH BETWEEN PERPENDICULARS =	231.37000 FEET
BEAM AT MIDSHIP =	9.00000 FEET
DRAFT AT MIDSHIP =	27.18000 FEET
DISPLACEMENT =	2289.687 LONG TONS
BLOCK COEFFICIENT =	1.45225
LONGITUDINAL CENTER OF BUOYANCY =	123.75142 FEET AFT OF F.P.
LONGITUDINAL CENTER OF BUOYANCY =	10.69727 STATIONS
GIVEN CENTER OF BUOYANCY =	11.30000 STATIONS
LONGITUDINAL CENTER OF FLOTATION =	110.36519 FEET AFT OF F.P.
LONGITUDINAL CENTER OF FLOTATION =	9.53496 STATIONS
VERTICAL CENTER OF BUOYANCY =	16.27842 FEET FROM THE DESIGNED LOAD WATERLINE
RADIUS OF GYRATION/L.B.P. =	0.32100
TRANSVERSE METACENTRIC HEIGHT =	11.10000 FEET
BEAM/DRAFT =	0.33113
LENGTH/BEAM =	25.70778

THE HEAVE-HEAVE RESTORING COEFFICIENT IS 4.48348
THE HEAVE-PITCH RESTORING COEFFICIENT IS -0.39568
THE PITCH-PITCH RESTORING COEFFICIENT IS 0.19438

PROJECTED AREA OF THE SUBMERGED HULL/L**2 = 0.911284E-01
MOMENT/L**3 = -0.111127E-02 MOMENT OF INERTIA/L**4 = 0.134836E-01

HULL SEPARATION/BEAM = 8.1356

PARTIAL SWATM2 OUTPUT (4 of 7)

SWATM2 SHIP MOTIONS OF SWATH OPTION C4(2): 4921 TON FFH

RMS MOTIONS IN UNIDIRECTIONAL SEAS

SPEED = 25.0 KNOTS FROUDE NO = 0.489

SEA STATE = 5 SIG WAVE HT = 9.8400 FEET WAVE PERIOD = 8.9400 SEC

HEADING (DEG)	SWAY ACC (G)	HEAVE (F)	HEAVE ACC (G)	ROLL (DEG)	PITCH (DEG)	YAW (DEG)
0.0	0.000	0.231	0.000	0.001	0.071	0.023
30.0	0.000	0.279	0.000	0.018	0.211	0.205
60.0	0.001	0.277	0.001	0.024	0.279	0.521
90.0	0.013	0.293	0.004	0.034	0.067	0.419
120.0	0.194	0.341	0.008	0.099	0.204	5.097
150.0	0.035	0.333	0.013	0.046	0.296	1.204
180.0	0.001	0.334	0.016	0.001	0.316	0.032

STATION = -0.8990 Z = 0.0000 F

HEADING	VERTICAL MOT	VERTICAL VEL	VERTICAL ACC	VERTICAL REL.MOT	VERTICAL REL.VEL	VROI	SWAY ACC	PROB (DW)	DW PER HOUR	PROB (KE)	KE PER HOUR	PROB (BI)	BI PER HOUR
DEG	F	F/SEC	G	F	F/SEC		G						
0.0	0.312	0.087	0.002	2.363	0.612	0.002	0.000	0.0000	0.0	0.0000	0.0	0.0000	0.0
30.0	0.306	0.063	0.001	2.107	0.423	0.000	0.000	0.0000	0.0	0.0000	0.0	0.0000	0.0
60.0	0.486	0.181	0.002	2.141	0.774	0.002	0.006	0.0000	0.0	0.0000	0.0	0.0000	0.0
90.0	0.237	0.165	0.004	2.216	1.748	0.004	0.036	0.0000	0.0	0.0000	0.0	0.0000	0.0
120.0	0.671	0.758	0.029	2.727	3.274	0.034	0.536	0.0000	0.0	0.0000	0.0	0.0000	0.0
150.0	0.556	0.834	0.047	2.445	3.785	0.050	0.168	0.0000	0.0	0.0000	0.0	0.0000	0.0
180.0	0.562	0.968	0.063	2.456	4.207	0.066	0.005	0.0000	0.0	0.0000	0.0	0.0000	0.0

STATION = 11.3000 Z = 0.0000 F

HEADING	VERTICAL MOT	VERTICAL VEL	VERTICAL ACC	VERTICAL REL.MOT	VERTICAL REL.VEL	VROI	SWAY ACC	PROB (DW)	DW PER HOUR	PROB (KE)	KE PER HOUR	PROB (BI)	BI PER HOUR
DEG	F	F/SEC	G	F	F/SEC		G						
0.0	0.229	0.032	0.000	2.059	0.530	0.000	0.000	0.0000	0.0	0.0000	0.0	0.0000	0.0
30.0	0.301	0.058	0.000	2.020	0.394	0.000	0.000	0.0000	0.0	0.0000	0.0	0.0000	0.0
60.0	0.303	0.109	0.001	2.066	0.743	0.001	0.001	0.0000	0.0	0.0000	0.0	0.0000	0.0
90.0	0.298	0.182	0.004	2.126	1.688	0.004	0.012	0.0000	0.0	0.0000	0.0	0.0000	0.0
120.0	0.334	0.283	0.008	2.155	2.679	0.009	0.195	0.0000	0.0	0.0000	0.0	0.0000	0.0
150.0	0.356	0.362	0.015	2.175	3.389	0.016	0.030	0.0000	0.0	0.0000	0.0	0.0000	0.0
180.0	0.362	0.425	0.018	2.136	3.594	0.020	0.001	0.0000	0.0	0.0000	0.0	0.0000	0.0

STATION = 18.6282 Z = 0.0000 F

HEADING	VERTICAL MOT	VERTICAL VEL	VERTICAL ACC	VERTICAL REL.MOT	VERTICAL REL.VEL	VROI	SWAY ACC	PROB (DW)	DW PER HOUR	PROB (KE)	KE PER HOUR	PROB (BI)	BI PER HOUR
DEG	F	F/SEC	G	F	F/SEC		G						
0.0	0.235	0.068	0.001	2.175	0.561	0.001	0.000	0.0000	0.0	0.0000	0.0	0.0000	0.0
30.0	0.590	0.115	0.001	1.950	0.386	0.000	0.000	0.0000	0.0	0.0000	0.0	0.0000	0.0
60.0	0.678	0.248	0.003	1.681	0.594	0.002	0.004	0.0000	0.0	0.0000	0.0	0.0000	0.0
90.0	0.366	0.222	0.004	2.076	1.655	0.005	0.020	0.0000	0.0	0.0000	0.0	0.0000	0.0
120.0	0.386	0.430	0.017	2.202	2.843	0.020	0.377	0.0000	0.0	0.0000	0.0	0.0000	0.0
150.0	0.727	0.941	0.045	2.733	4.069	0.050	0.077	0.0000	0.0	0.0000	0.0	0.0000	0.0
180.0	0.775	1.089	0.060	2.787	4.445	0.064	0.003	0.0000	0.0	0.0000	0.0	0.0000	0.0

PARTIAL SWATM2 OUTPUT (5 of 7)

SWATMO SHIP MOTIONS OF SWATH OPTION C4(2): 4921 TON FFH

RMS MOTIONS IN SHORT-CRESTED SEAS - SPREADING ANGLE = 60.00 DEG

SPEED = 25.0 KNOTS FROUDE NO = 0.489

SEA STATE = 5 SIG WAVE HT = 9.8400 FEET WAVE PERIOD = 8.9400 SEC

HEADING (DEG)	SWAY ACC (G)	HEAVE (F)	HEAVE ACC (G)	ROLL (DEG)	PITCH (DEG)	YAW (DEG)
0.0	0.002	0.261	0.000	0.013	0.163	0.181
30.0	0.004	0.270	0.001	0.017	0.210	0.328
60.0	0.025	0.282	0.002	0.027	0.222	0.716
90.0	0.092	0.302	0.005	0.055	0.172	2.425
120.0	0.129	0.327	0.009	0.074	0.210	3.422
150.0	0.098	0.335	0.013	0.059	0.281	2.636
180.0	0.029	0.334	0.015	0.024	0.310	0.836

STATION = -0.8990 Z = 0.0000 F

HEADING	VERTICAL MOT F	VEL F/SEC	ACC G	REL.MOT F	REL.VEL F/SEC	VROI	SWAY ACC G	PROB (DW)	DW PER HOUR	PROB (KE)	KE PER HOUR	PROB (BI)	BI PER HOUR
0.0	0.303	0.072	0.001	2.287	0.498	0.001	0.005	0.0000	0.0	0.0000	0.0	0.0000	0.0
30.0	0.357	0.106	0.001	2.168	0.573	0.001	0.011	0.0000	0.0	0.0000	0.0	0.0000	0.0
60.0	0.389	0.165	0.004	2.155	1.071	0.004	0.066	0.0000	0.0	0.0000	0.0	0.0000	0.0
90.0	0.432	0.396	0.015	2.335	2.086	0.017	0.255	0.0000	0.0	0.0000	0.0	0.0000	0.0
120.0	0.554	0.678	0.031	2.533	3.111	0.035	0.367	0.0000	0.0	0.0000	0.0	0.0000	0.0
150.0	0.587	0.847	0.048	2.517	3.766	0.051	0.290	0.0000	0.0	0.0000	0.0	0.0000	0.0
180.0	0.557	0.921	0.059	2.447	4.083	0.062	0.102	0.0000	0.0	0.0000	0.0	0.0000	0.0

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STATION = 11.3000 Z = 0.0000 F

HEADING	VERTICAL MOT F	VEL F/SEC	ACC G	REL.MOT F	REL.VEL F/SEC	VROI	SWAY ACC G	PROB (DW)	DW PER HOUR	PROB (KE)	KE PER HOUR	PROB (BI)	BI PER HOUR
0.0	0.274	0.049	0.000	2.035	0.448	0.000	0.002	0.0000	0.0	0.0000	0.0	0.0000	0.0
30.0	0.288	0.071	0.001	2.039	0.537	0.001	0.004	0.0000	0.0	0.0000	0.0	0.0000	0.0
60.0	0.301	0.124	0.002	2.070	1.021	0.002	0.025	0.0000	0.0	0.0000	0.0	0.0000	0.0
90.0	0.308	0.200	0.005	2.118	1.834	0.005	0.092	0.0000	0.0	0.0000	0.0	0.0000	0.0
120.0	0.331	0.291	0.009	2.152	2.677	0.011	0.128	0.0000	0.0	0.0000	0.0	0.0000	0.0
150.0	0.352	0.371	0.014	2.161	3.277	0.016	0.097	0.0000	0.0	0.0000	0.0	0.0000	0.0
180.0	0.360	0.413	0.017	2.148	3.538	0.019	0.028	0.0000	0.0	0.0000	0.0	0.0000	0.0

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STATION = 18.6282 Z = 0.0000 F

HEADING	VERTICAL MOT F	VEL F/SEC	ACC G	REL.MOT F	REL.VEL F/SEC	VROI	SWAY ACC G	PROB (DW)	DW PER HOUR	PROB (KE)	KE PER HOUR	PROB (BI)	BI PER HOUR
0.0	0.466	0.097	0.001	2.051	0.461	0.001	0.004	0.0000	0.0	0.0000	0.0	0.0000	0.0
30.0	0.558	0.151	0.002	1.948	0.496	0.001	0.008	0.0000	0.0	0.0000	0.0	0.0000	0.0
60.0	0.589	0.215	0.003	1.855	0.956	0.003	0.047	0.0000	0.0	0.0000	0.0	0.0000	0.0
90.0	0.469	0.300	0.010	2.020	1.872	0.011	0.178	0.0000	0.0	0.0000	0.0	0.0000	0.0
120.0	0.491	0.570	0.026	2.316	2.978	0.029	0.251	0.0000	0.0	0.0000	0.0	0.0000	0.0
150.0	0.672	0.883	0.044	2.625	3.896	0.048	0.192	0.0000	0.0	0.0000	0.0	0.0000	0.0
180.0	0.766	1.053	0.056	2.778	4.346	0.061	0.059	0.0000	0.0	0.0000	0.0	0.0000	0.0

PARTIAL SWATM2 OUTPUT (6 of 7)

SWATMO SHIP MOTIONS OF SWATH OPTION C4(2): 4921 TON FFH PAGE 10

RMS MOTIONS IN UNIDIRECTIONAL SEAS

SPEED = 25.0 KNOTS FROUDE NO = 0.489

SEA STATE = 6 SIG WAVE HT = 16.4000 FEET WAVE PERIOD = 9.7400 SEC

HEADING (DEG)	SWAY ACC (G)	HEAVE (F)	HEAVE ACC (G)	ROLL (DEG)	PITCH (DEG)	YAW (DEG)
0.0	0.000	0.420	0.000	0.002	0.114	0.032
30.0	0.000	0.512	0.001	0.026	0.363	0.295
60.0	0.002	0.507	0.002	0.035	0.430	0.735
90.0	0.019	0.526	0.006	0.049	0.114	0.621
120.0	0.268	0.602	0.013	0.138	0.287	7.017
150.0	0.049	0.596	0.020	0.067	0.431	1.696
180.0	0.001	0.594	0.025	0.002	0.468	0.046

STATION = -0.8998 Z = 0.0000 F

HEADING	VERTICAL MOT	VERTICAL VEL	VERTICAL ACC	VERTICAL REL.MOT	VERTICAL REL.VEL	VROI	SWAY ACC	PROB (DW)	DW PER HOUR	PROB (KE)	KE PER HOUR	PROB (BI)	BI PER HOUR
DEG	F	F/SEC	G	F	F/SEC		G						
0.0	0.557	0.144	0.002	3.690	0.977	0.003	0.000	0.0000	0.0	0.0000	0.0	0.0000	0.0
30.0	0.497	0.103	0.001	3.189	0.681	0.001	0.001	0.0000	0.0	0.0000	0.0	0.0000	0.0
60.0	0.693	0.258	0.003	3.307	1.186	0.002	0.008	0.0000	0.0	0.0000	0.0	0.0000	0.0
90.0	0.386	0.258	0.006	3.403	2.635	0.006	0.055	0.0000	0.0	0.0000	0.0	0.0000	0.0

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SWATMO SHIP MOTIONS OF SWATH OPTION C4(2): 4921 TON FFH PAGE 11

RMS MOTIONS IN SHORT-CRESTED SEAS - SPREADING ANGLE = 60.00 DEG

SPEED = 25.0 KNOTS FROUDE NO = 0.489

SEA STATE = 6 SIG WAVE HT = 16.4000 FEET WAVE PERIOD = 9.7400 SEC

HEADING (DEG)	SWAY ACC (G)	HEAVE (F)	HEAVE ACC (G)	ROLL (DEG)	PITCH (DEG)	YAW (DEG)
0.0	0.003	0.477	0.001	0.019	0.278	0.256
30.0	0.005	0.494	0.001	0.026	0.345	0.461
60.0	0.034	0.513	0.003	0.039	0.354	0.998
90.0	0.127	0.541	0.008	0.078	0.263	3.347
120.0	0.178	0.582	0.014	0.103	0.303	4.721
150.0	0.135	0.597	0.020	0.083	0.416	3.639
180.0	0.040	0.594	0.024	0.035	0.458	1.162

STATION = -0.8998 Z = 0.0000 F

HEADING	VERTICAL MOT	VERTICAL VEL	VERTICAL ACC	VERTICAL REL.MOT	VERTICAL REL.VEL	VROI	SWAY ACC	PROB (DW)	DW PER HOUR	PROB (KE)	KE PER HOUR	PROB (BI)	BI PER HOUR
DEG	F	F/SEC	G	F	F/SEC		G						
0.0	0.513	0.117	0.002	3.385	0.798	0.001	0.007	0.0000	0.0	0.0000	0.0	0.0000	0.0
30.0	0.560	0.159	0.002	3.320	0.899	0.002	0.014	0.0000	0.0	0.0000	0.0	0.0000	0.0

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PARTIAL SWATM2 OUTPUT (7 of 7)

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SWATH OPTION C4(2): 4921 TON FFH
 1   1   0   0   0   0   0
30   13   6   30   5   30   3
 9.5    10.0
 0.0   15.0   30.0   45.0   60.0   75.0   90.0  105.0
120.0  135.0  150.0  165.0  180.0
 0.09790    0.19580  0.29360   0.39150   0.48940    0.58730
41.11
0.0   4.32   7.87   15.82   18.15
40.5 62.5 40.5 40.5 31.5
231.37     0.321     0.35     11.30     -0.30     11.10    19.06
 20.0     27.24     19.06     9.25     11.50     1.50     2.53    1.20
227.0     22.36     19.06     15.75     19.50     1.50     2.27    1.20
  0.5      0.07
 3
13
0.0
11.483  3.2
11.483  4.6
11.483  6.3
11.483  7.5
11.483   8.8
11.483  9.7
11.483   10.9
11.483   12.4
11.483   13.8
11.483   15.0
11.483   16.4
11.483   18.0
11.483   20.0
40.50   33.00
40.50   18.50
40.50   18.50
40.50   18.50
40.50   18.50
-2.5    7    0
-2.0    7    0
-1.0    7    0
 0.0    7    0
 1.0    11   0
 2.0    11   0
 3.0    11   0
 4.0    11   0
 5.0    11   0
 6.0    11   0
 7.0    11   0
 8.0    11   0
 9.0    11   2
10.0    11   1
11.0    11   1
12.0    11   0
13.0    11   0
14.0    11   0
15.0    11   0
16.0    11   0
```

SWPA INPUT (1 of 3)

```
17.0   11    0
18.0   11    0
19.0   11    0
20.0    7    0
21.0    7    0
22.0    7    0
23.0    7    0
24.0    7    0
25.0    7    0
26.0    7    0
 0.00 -2.60 -2.60  0.00  2.60  2.60  0.00
12.55 11.05  8.05  6.55  8.05 11.05 12.55
 0.00 -5.63 -5.63  0.00  5.63  5.63  0.00
16.05 12.80  6.30  3.05  6.30 12.80 16.05
 0.00 -7.90 -7.90  0.00  7.90  7.90  0.00
18.68 14.12  4.99  0.43  4.99 14.12 18.68
 0.00 -8.05 -8.05  0.00  8.05  8.05  0.00
18.85 14.20  4.98  0.25  4.98 14.20 18.85
-2.50 -2.50 -2.50 -8.19 -7.03  0.00  7.03  8.19  2.50  2.50  2.50
28.61 23.22 17.83 12.34  4.51  0.98  4.51 12.34 17.83 23.22 28.61
-3.10 -3.10 -3.10 -7.85 -6.45  0.00  6.45  7.85  3.10  3.10  3.10
28.61 22.84 17.07 11.66  4.61  1.43  4.61 11.66 17.07 22.84 28.61
-3.55 -3.55 -3.55 -7.93 -6.35  0.00  6.35  7.93  3.55  3.55  3.55
28.61 22.74 16.86 11.35  4.48  1.43  4.48 11.35 16.86 22.74 28.61
-3.90 -3.90 -3.90 -7.98 -6.26  0.00  6.26  7.98  3.90  3.90  3.90
28.61 22.65 16.68 11.09  4.38  1.43  4.38 11.09 16.68 22.65 28.61
-4.10 -4.10 -4.10 -8.01 -6.21  0.00  6.21  8.01  4.10  4.10  4.10
28.61 22.59 16.57 10.94  4.32  1.43  4.32 10.94 16.57 22.59 28.61
-4.30 -4.30 -4.30 -8.03 -6.16  0.00  6.16  8.03  4.30  4.30  4.30
28.61 22.53 16.45 10.78  4.26  1.43  4.26 10.78 16.45 22.53 28.61
-4.38 -4.38 -4.38 -8.04 -6.15  0.00  6.15  8.04  4.38  4.38  4.38
28.61 22.51 16.40 10.73  4.24  1.43  4.24 10.73 16.40 22.51 28.61
-4.45 -4.45 -4.45 -8.05 -6.13  0.00  6.13  8.05  4.45  4.45  4.45
28.61 22.48 16.35 10.67  4.22  1.43  4.22 10.67 16.35 22.48 28.61
-4.50 -4.50 -4.50 -8.05 -6.11  0.00  6.11  8.05  4.50  4.50  4.50
28.61 22.47 16.32 10.63  4.20  1.43  4.20 10.63 16.32 22.47 28.61
-4.50 -4.50 -4.50 -8.05 -6.11  0.00  6.11  8.05  4.50  4.50  4.50
28.61 22.47 16.32 10.63  4.20  1.43  4.20 10.63 16.32 22.47 28.61
-4.50 -4.50 -4.50 -8.05 -6.11  0.00  6.11  8.05  4.50  4.50  4.50
28.61 22.47 16.32 10.63  4.20  1.43  4.20 10.63 16.32 22.47 28.61
-4.45 -4.45 -4.45 -8.05 -6.13  0.00  6.13  8.05  4.45  4.45  4.45
28.61 22.48 16.35 10.67  4.22  1.43  4.22 10.67 16.35 22.48 28.61
-4.25 -4.25 -4.25 -8.03 -6.18  0.00  6.18  8.03  4.25  4.25  4.25
28.61 22.55 16.46 10.82  4.28  1.43  4.28 10.82 16.46 22.55 28.61
-4.00 -4.00 -4.00 -7.99 -6.24  0.00  6.24  7.99  4.00  4.00  4.00
28.61 22.62 16.63 11.01  4.35  1.43  4.35 11.01 16.63 22.62 28.61
-3.70 -3.70 -3.70 -7.95 -6.31  0.00  6.31  7.95  3.70  3.70  3.70
28.61 22.70 16.79 11.24  4.44  1.43  4.44 11.24 16.79 22.70 28.61
-3.25 -3.25 -3.25 -7.87 -6.41  0.00  6.41  7.87  3.25  3.25  3.25
28.61 22.81 17.00 11.56  4.57  1.43  4.57 11.56 17.00 22.81 28.61
-2.70 -2.70 -2.70 -7.77 -6.53  0.00  6.53  7.77  2.70  2.70  2.70
28.61 22.92 17.22 11.94  4.73  1.43  4.73 11.94 17.22 22.92 28.61
-2.00 -2.00 -2.00 -7.61 -6.68  0.00  6.68  7.61  2.00  2.00  2.00
28.61 23.02 17.43 12.48  4.92  1.43  4.92 12.48 17.43 23.02 28.61
-1.18 -1.18 -1.18 -7.85 -7.29  0.00  7.29  7.85  1.18  1.18  1.18
28.61 23.37 18.12 13.18  4.89  0.98  4.89 13.18 18.12 23.37 28.61
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SWPA INPUT (2 of 3)

```
 0.00 -8.05 -8.05  0.00  8.05  8.05  0.00
18.85 14.20  4.90  0.25  4.90 14.20 18.85
 0.00 -8.12 -8.12  0.00  8.12  8.12  0.00
18.92 14.23  4.86  0.17  4.86 14.23 18.92
 0.00 -7.49 -7.49  0.00  7.49  7.49  0.00
18.20 13.88  5.23  0.90  5.23 13.88 18.20
 0.00 -6.52 -6.52  0.00  6.52  6.52  0.00
17.08 13.32  5.79  2.03  5.79 13.32 17.08
 0.00 -5.00 -5.00  0.00  5.00  5.00  0.00
15.32 12.43  6.66  3.77  6.66 12.43 15.32
 0.00 -2.86 -2.86  0.00  2.86  2.86  0.00
12.85 11.20  7.90  6.25  7.90 11.20 12.85
 0.00 -0.09 -0.09  0.00  0.09  0.09  0.00
 9.65  9.60  9.50  9.45  9.50  9.60  9.65
```

SWPA INPUT (3 of 3)

```
0.000   0.015
1.726   1.217   1.220   1.364   1.558
1.395   1.002   1.000   1.119   1.266
0.010   0.006   0.003   0.005   0.007
0.001   0.008   0.000   0.015   0.002
0.001   0.022
3.014   2.093   2.059   2.386   2.858
2.265   1.547   1.534   1.765   2.105
0.018   0.012   0.007   0.012   0.015
0.001   0.023   0.001   0.022   0.003
0.001   0.030
2.715   2.294   2.362   3.109   3.736
1.898   1.477   1.485   1.848   2.226
0.016   0.013   0.015   0.025   0.029
0.002   0.046   0.001   0.030   0.003
0.001   0.034
2.401   2.373   2.725   4.259   5.025
1.576   1.386   1.585   2.174   2.580
0.016   0.016   0.020   0.034   0.038
0.003   0.058   0.001   0.034   0.003
0.001   0.035
2.052   2.199   2.720   4.689   5.589
1.279   1.220   1.414   2.259   2.664
0.015   0.018   0.022   0.036   0.040
0.003   0.063   0.001   0.035   0.003
0.001   0.034
1.825   1.999   2.550   4.574   5.374
1.108   1.088   1.298   2.161   2.545
0.014   0.018   0.022   0.034   0.038
0.004   0.063   0.001   0.034   0.003
0.001   0.032
1.559   1.720   2.254   4.189   4.928
0.920   0.923   1.128   1.945   2.290
0.013   0.017   0.020   0.031   0.035
0.004   0.062   0.001   0.032   0.003
0.001   0.029
1.289   1.412   1.889   3.618   4.262
0.739   0.749   0.933   1.652   1.946
0.012   0.015   0.018   0.027   0.030
0.005   0.060   0.001   0.029   0.003
0.001   0.027
1.094   1.179   1.597   3.120   3.680
0.612   0.621   0.782   1.407   1.658
0.011   0.013   0.016   0.023   0.025
0.005   0.058   0.001   0.027   0.002
0.001   0.025
0.958   1.018   1.388   2.746   3.242
0.526   0.533   0.675   1.228   1.447
0.010   0.012   0.014   0.020   0.022
0.005   0.055   0.001   0.025   0.002
0.001   0.024
0.828   0.865   1.186   2.373   2.804
0.446   0.451   0.574   1.052   1.241
0.009   0.010   0.012   0.017   0.019
0.004   0.052   0.001   0.024   0.002
```

SWPA INPUT (1 of 4)

```
0.001  0.022
0.706  0.726  1.000  2.021  2.389
0.374  0.378  0.482  0.890  1.050
0.007  0.009  0.010  0.015  0.016
0.004  0.049  0.001  0.022  0.002
0.001  0.020
0.585  0.594  0.821  1.671  1.977
0.306  0.308  0.394  0.732  0.864
0.006  0.007  0.009  0.012  0.013
0.004  0.045  0.001  0.020  0.002
0.005  0.015
1.723  1.191  1.227  1.345  1.544
1.420  0.995  1.022  1.120  1.275
0.010  0.006  0.003  0.005  0.007
0.006  0.007  0.005  0.015  0.011
0.007  0.021
2.911  2.061  2.069  2.351  2.781
2.225  1.544  1.562  1.764  2.081
0.017  0.011  0.007  0.011  0.014
0.009  0.023  0.007  0.021  0.017
0.007  0.030
2.609  2.256  2.365  3.052  3.633
1.851  1.468  1.505  1.833  2.184
0.016  0.013  0.014  0.025  0.029
0.013  0.046  0.007  0.030  0.019
0.007  0.034
2.313  2.341  2.718  4.192  4.920
1.535  1.378  1.518  2.154  2.539
0.015  0.016  0.020  0.034  0.038
0.015  0.058  0.007  0.034  0.018
0.006  0.035
1.980  2.174  2.710  4.618  5.406
1.246  1.214  1.422  2.239  2.627
0.015  0.018  0.022  0.036  0.040
0.017  0.062  0.006  0.035  0.017
0.006  0.034
1.762  1.978  2.539  4.504  5.276
1.079  1.084  1.304  2.141  2.511
0.014  0.018  0.022  0.035  0.039
0.018  0.063  0.006  0.034  0.016
0.005  0.032
1.505  1.703  2.243  4.124  4.838
0.896  0.919  1.132  1.926  2.260
0.013  0.017  0.021  0.031  0.035
0.019  0.062  0.005  0.032  0.015
0.005  0.029
1.245  1.399  1.880  3.560  4.183
0.720  0.746  0.936  1.636  1.920
0.012  0.015  0.018  0.027  0.030
0.020  0.060  0.005  0.029  0.013
0.005  0.027
1.056  1.168  1.589  3.069  3.611
0.596  0.619  0.784  1.393  1.636
0.011  0.013  0.016  0.023  0.025
0.019  0.058  0.005  0.027  0.012
```

SWPA INPUT (2 of 4)

0.004	0.025			
0.926	1.008	1.380	2.700	3.181
0.512	0.531	0.677	1.215	1.428
0.010	0.012	0.014	0.020	0.022
0.019	0.055	0.004	0.025	0.011
0.004	0.023			
0.800	0.857	1.179	2.333	2.750
0.434	0.450	0.576	1.041	1.224
0.009	0.010	0.012	0.018	0.019
0.018	0.052	0.004	0.023	0.011
0.004	0.022			
0.682	0.720	0.995	1.986	2.343
0.365	0.377	0.484	0.881	1.036
0.007	0.009	0.010	0.015	0.016
0.017	0.049	0.004	0.022	0.010
0.004	0.020			
0.566	0.588	0.816	1.642	1.939
0.298	0.307	0.395	0.724	0.852
0.006	0.007	0.009	0.012	0.013
0.016	0.045	0.004	0.020	0.009
0.006	0.013			
1.622	1.195	1.237	1.294	1.481
1.407	1.040	1.076	1.125	1.285
0.009	0.005	0.002	0.004	0.006
0.007	0.007	0.006	0.013	0.015
0.010	0.019			
2.585	2.060	2.114	2.285	2.558
2.068	1.612	1.655	1.783	2.001
0.014	0.009	0.007	0.010	0.012
0.013	0.022	0.010	0.019	0.025
0.010	0.030			
2.311	2.215	2.398	2.947	3.381
1.699	1.496	1.579	1.822	2.076
0.015	0.013	0.014	0.025	0.028
0.019	0.045	0.010	0.030	0.026
0.009	0.034			
2.079	2.304	2.728	4.056	4.677
1.414	1.395	1.570	2.130	2.447
0.015	0.016	0.021	0.034	0.039
0.022	0.057	0.009	0.034	0.025
0.008	0.034			
1.798	2.146	2.788	4.463	5.162
1.153	1.227	1.459	2.206	2.545
0.015	0.018	0.023	0.036	0.041
0.024	0.062	0.008	0.034	0.023
0.008	0.033			
1.604	1.955	2.533	4.346	5.039
1.001	1.095	1.335	2.106	2.434
0.015	0.018	0.023	0.035	0.039
0.026	0.063	0.008	0.033	0.022
0.007	0.032			
1.371	1.685	2.235	3.973	4.618
0.832	0.929	1.156	1.892	2.191
0.014	0.017	0.021	0.032	0.035
0.027	0.062	0.007	0.032	0.020

SWPA INPUT (3 of 4)

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0.001	0.017			
3.040	2.902	2.785	3.044	3.281
5.313	4.925	4.738	5.040	5.459
0.066	0.040	0.023	0.047	0.061
0.007	0.028	0.001	0.017	0.007
0.002	0.018			
3.376	3.213	3.069	3.142	3.298
4.545	4.252	4.087	4.325	4.650
0.056	0.039	0.031	0.046	0.055
0.008	0.041	0.002	0.018	0.007
0.002	0.019			
3.694	3.467	3.267	3.154	3.252
4.187	3.920	3.754	3.901	4.162
0.053	0.041	0.036	0.047	0.055
0.009	0.048	0.002	0.019	0.007
0.002	0.020			
3.949	3.637	3.370	3.074	3.121
3.804	3.548	3.371	3.404	3.597
0.050	0.042	0.040	0.049	0.054
0.011	0.054	0.002	0.020	0.007
0.002	0.020			
3.923	3.551	3.242	2.845	2.868
3.358	3.108	2.925	2.869	3.007
0.046	0.042	0.041	0.047	0.051
0.012	0.057	0.002	0.020	0.007
0.002	0.019			
3.674	3.289	2.976	2.566	2.584
2.954	2.718	2.541	2.448	2.554
0.042	0.039	0.038	0.044	0.047
0.012	0.057	0.002	0.019	0.006
0.002	0.019			
3.385	3.011	2.710	2.317	2.336
2.633	2.412	2.246	2.141	2.229
0.038	0.036	0.036	0.040	0.043
0.012	0.056	0.002	0.019	0.006
0.002	0.018			
3.030	2.681	2.403	2.043	2.062
2.297	2.097	1.946	1.848	1.912
0.034	0.032	0.032	0.036	0.038
0.012	0.054	0.002	0.018	0.006
0.002	0.017			
2.646	2.332	2.084	1.765	1.784
1.969	1.793	1.660	1.560	1.619
0.029	0.028	0.028	0.031	0.033
0.012	0.051	0.002	0.017	0.005
0.001	0.015			
2.230	1.959	1.748	1.476	1.493
1.637	1.487	1.373	1.285	1.332
0.024	0.024	0.024	0.026	0.028
0.011	0.047	0.001	0.015	0.005

SWPA INPUT (4 of 4)

```
 90.000  6  5 13 13  19.000   0 178  85.190 1
 0.000   1.000   0.000
 0.259   0.966  15.000
 0.500   0.866  30.000
 0.707   0.707  45.000
 0.866   0.500  60.000
 0.966   0.259  75.000
 1.000   0.000  90.000
 0.966  -0.259 105.000
 0.866  -0.500 120.000
 0.707  -0.707 135.000
 0.500  -0.866 150.000
 0.259  -0.966 165.000
 0.000  -1.000 180.000
 0.000  40.500  40.500  33.000  18.600  34.200
 4.320  62.500  40.500  18.500  27.180  56.200
 7.870  40.500  40.500  18.500  27.180  34.200
15.820  40.500  40.500  18.500  27.180  34.200
18.150  31.500  40.500  18.500  27.259  25.200
 3.200   4.800   6.300   7.500   8.800   9.700  10.900  12.400  13.800  15.000  16.400  18.000  20.000
   5    10    15    20    25    30
1.371 1.361 1.351 1.348 1.338 1.326
```

SHORT DAT (1 of 1)

```
0.005  0.014
1.073  1.205  1.234  1.334  1.517
1.399  1.024  1.046  1.128  1.273
0.009  0.006  0.003  0.005  0.007
0.006  0.007  0.005  0.014  0.012
0.007  0.021
2.000  2.069  2.091  2.331  2.706
2.163  1.577  1.603  1.773  2.050
0.016  0.011  0.007  0.011  0.014
0.010  0.023  0.007  0.021  0.019
0.007  0.030
2.517  2.252  2.383  3.023  3.555
1.798  1.485  1.538  1.833  2.149
0.016  0.013  0.014  0.025  0.029
0.014  0.046  0.007  0.030  0.020
0.007  0.034
2.244  2.337  2.727  4.152  4.844
1.495  1.390  1.541  2.149  2.510
0.015  0.016  0.020  0.034  0.038
0.017  0.058  0.007  0.034  0.019
0.006  0.035
1.928  2.172  2.713  4.569  5.328
1.217  1.224  1.439  2.230  2.601
0.015  0.018  0.022  0.036  0.040
0.018  0.062  0.006  0.035  0.018
0.006  0.034
1.717  1.976  2.541  4.454  5.199
1.055  1.092  1.318  2.131  2.486
0.014  0.018  0.022  0.035  0.039
0.020  0.063  0.006  0.034  0.017
0.005  0.032
1.467  1.702  2.243  4.075  4.766
0.876  0.926  1.143  1.916  2.238
0.013  0.017  0.021  0.031  0.035
0.021  0.062  0.005  0.032  0.015
0.005  0.029
1.213  1.399  1.879  3.515  4.118
0.704  0.752  0.944  1.626  1.901
0.012  0.015  0.018  0.027  0.030
0.021  0.060  0.005  0.029  0.014
0.005  0.027
1.029  1.169  1.588  3.027  3.552
0.583  0.624  0.791  1.384  1.619
0.011  0.013  0.016  0.023  0.025
0.021  0.058  0.005  0.027  0.013
0.004  0.025
0.902  1.009  1.380  2.662  3.127
0.501  0.535  0.683  1.207  1.412
0.010  0.012  0.014  0.020  0.022
0.021  0.055  0.004  0.025  0.012
0.004  0.023
0.779  0.858  1.179  2.299  2.703
0.425  0.454  0.581  1.033  1.211
0.009  0.010  0.012  0.018  0.019
0.020  0.052  0.004  0.023  0.011
0.004  0.022
0.664  0.721  0.995  1.956  2.301
0.357  0.380  0.488  0.874  1.024
0.007  0.009  0.010  0.015  0.016
0.018  0.049  0.004  0.022  0.010
```

ABBREVIATED SCSMOT.DAT (1 of 4)

```
0.004  0.020
0.551  0.590  0.816  1.617  1.904
0.292  0.309  0.398  0.718  0.842
0.006  0.007  0.009  0.012  0.013
0.017  0.045  0.004  0.020  0.009
0.005  0.014
1.638  1.213  1.241  1.329  1.498
1.384  1.047  1.068  1.140  1.273
0.009  0.005  0.003  0.004  0.006
0.006  0.007  0.005  0.014  0.013
0.008  0.021
2.721  2.074  2.114  2.313  2.650
2.119  1.604  1.641  1.781  2.029
0.016  0.011  0.007  0.011  0.013
0.011  0.022  0.008  0.021  0.020
0.008  0.030
2.458  2.255  2.402  3.000  3.497
1.764  1.505  1.570  1.834  2.123
0.016  0.013  0.014  0.025  0.029
0.016  0.045  0.008  0.030  0.022
0.007  0.034
2.205  2.340  2.736  4.118  4.783
1.472  1.405  1.564  2.146  2.488
0.016  0.016  0.020  0.034  0.038
0.018  0.057  0.007  0.034  0.020
0.007  0.035
1.900  2.175  2.717  4.528  5.263
1.281  1.236  1.455  2.223  2.588
0.015  0.018  0.023  0.036  0.041
0.020  0.062  0.007  0.035  0.019
0.007  0.034
1.693  1.980  2.543  4.411  5.135
1.042  1.103  1.331  2.123  2.466
0.015  0.018  0.022  0.035  0.039
0.022  0.063  0.007  0.034  0.018
0.006  0.032
1.447  1.705  2.244  4.033  4.705
0.867  0.935  1.154  1.907  2.219
0.014  0.017  0.021  0.032  0.035
0.023  0.062  0.006  0.032  0.017
0.006  0.029
1.196  1.402  1.879  3.476  4.063
0.696  0.759  0.952  1.618  1.884
0.012  0.015  0.018  0.027  0.030
0.023  0.060  0.006  0.029  0.015
0.005  0.027
1.014  1.172  1.588  2.992  3.503
0.576  0.630  0.797  1.376  1.604
0.011  0.013  0.016  0.023  0.026
0.023  0.058  0.005  0.027  0.014
0.005  0.025
0.868  1.013  1.380  2.629  3.082
0.495  0.541  0.688  1.199  1.399
0.010  0.012  0.014  0.020  0.022
0.022  0.055  0.005  0.025  0.013
0.005  0.023
0.767  0.862  1.179  2.269  2.662
0.420  0.458  0.585  1.027  1.199
0.009  0.010  0.012  0.018  0.019
0.022  0.052  0.005  0.023  0.012
```

ABBREVIATED SCSMOT.DAT (2 of 4)

0.004	0.022			
0.654	0.724	0.995	1.930	2.266
0.353	0.384	0.492	0.868	1.014
0.007	0.009	0.010	0.015	0.016
0.020	0.049	0.004	0.022	0.011
0.004	0.020			
0.542	0.593	0.816	1.595	1.873
0.286	0.313	0.402	0.713	0.834
0.006	0.007	0.009	0.012	0.013
0.019	0.045	0.004	0.020	0.010
0.006	0.013			
1.538	1.227	1.258	1.312	1.441
1.341	1.183	1.131	1.169	1.268
0.009	0.005	0.003	0.004	0.006
0.008	0.006	0.006	0.013	0.017
0.009	0.020			
2.520	2.094	2.171	2.268	2.504
2.012	1.682	1.747	1.808	1.976
0.017	0.011	0.007	0.010	0.013
0.014	0.021	0.009	0.020	0.024
0.009	0.029			
2.329	2.277	2.454	2.943	3.344
1.695	1.569	1.661	1.845	2.063
0.017	0.014	0.014	0.025	0.029
0.020	0.045	0.009	0.029	0.025
0.008	0.033			
2.130	2.359	2.762	4.025	4.615
1.434	1.458	1.630	2.140	2.431
0.016	0.017	0.021	0.034	0.039
0.023	0.057	0.008	0.033	0.023
0.007	0.034			
1.852	2.194	2.728	4.410	5.081
1.180	1.279	1.503	2.205	2.523
0.016	0.019	0.023	0.037	0.041
0.025	0.062	0.007	0.034	0.022
0.007	0.033			
1.653	1.998	2.549	4.289	4.953
1.027	1.140	1.370	2.101	2.411
0.015	0.019	0.023	0.035	0.039
0.026	0.063	0.007	0.033	0.020
0.007	0.031			
1.413	1.722	2.247	3.914	4.533
0.855	0.966	1.184	1.883	2.167
0.014	0.018	0.021	0.032	0.036
0.027	0.062	0.007	0.031	0.019
0.007	0.029			
1.166	1.417	1.880	3.366	3.907
0.688	0.784	0.976	1.594	1.838
0.013	0.016	0.019	0.028	0.031
0.028	0.060	0.007	0.029	0.017
0.006	0.027			
0.988	1.186	1.588	2.891	3.362
0.569	0.650	0.816	1.354	1.564
0.012	0.014	0.016	0.024	0.026
0.027	0.057	0.006	0.027	0.015

ABBREVIATED SCSMOT.DAT (3 of 4)

```
0.006  0.025
0.865  1.026  1.380  2.537  2.954
0.489  0.559  0.705  1.179  1.363
0.010  0.012  0.015  0.021  0.023
0.027  0.055  0.006  0.025  0.014
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0.003  0.017
3.035  2.905  2.791  3.040  3.267
5.201  4.847  4.662  4.945  5.342
0.062  0.037  0.022  0.044  0.057
0.015  0.028  0.003  0.017  0.013
0.003  0.018
3.341  3.193  3.062  3.148  3.299
4.445  4.178  4.020  4.247  4.556
0.053  0.037  0.030  0.044  0.052
0.016  0.041  0.003  0.018  0.013
0.003  0.019
3.643  3.435  3.253  3.167  3.264
4.090  3.847  3.698  3.835  4.083
0.050  0.040  0.035  0.045  0.052
0.017  0.048  0.003  0.019  0.013
0.003  0.020
3.890  3.598  3.351  3.093  3.142
3.711  3.477  3.311  3.352  3.536
0.048  0.041  0.039  0.047  0.052
0.017  0.054  0.003  0.020  0.012
0.002  0.020
3.864  3.512  3.223  2.865  2.890
3.273  3.043  2.872  2.829  2.960
0.045  0.041  0.040  0.046  0.049
0.018  0.057  0.002  0.020  0.011
0.002  0.019
3.620  3.253  2.959  2.584  2.604
2.879  2.660  2.495  2.415  2.516
0.041  0.038  0.037  0.042  0.045
0.018  0.057  0.002  0.019  0.010
0.002  0.019
3.335  2.978  2.694  2.333  2.353
2.566  2.360  2.205  2.113  2.197
0.037  0.035  0.035  0.039  0.041
0.017  0.056  0.002  0.019  0.009
0.002  0.018
2.986  2.652  2.390  2.057  2.076
2.238  2.052  1.911  1.817  1.885
0.033  0.031  0.031  0.035  0.037
0.017  0.054  0.002  0.018  0.009
0.002  0.017
2.668  2.387  2.072  1.777  1.795
1.919  1.754  1.629  1.540  1.597
0.028  0.027  0.027  0.030  0.032
0.016  0.051  0.002  0.017  0.008
0.002  0.015
2.198  1.939  1.737  1.485  1.502
1.595  1.455  1.348  1.269  1.314
0.024  0.023  0.023  0.025  0.027
0.015  0.047  0.002  0.015  0.007
```

ABBREVIATED SCSMOT.DAT (4 of 4)

0.2 0.2 2.4 2.2 1.6 1.9 1.1 1.0 0.4 0.3 0.2 0.1 0.0
0.0 0.1 2.7 4.8 3.8 3.6 2.1 2.1 1.0 1.0 0.4 0.2 0.2
0.0 0.0 0.0 1.9 5.1 5.3 3.3 2.5 1.3 1.0 0.5 0.3 0.1
0.0 0.0 0.0 0.0 0.8 4.6 3.9 3.4 1.3 1.0 0.5 0.2 0.1
0.0 0.0 0.0 0.0 0.0 0.6 3.3 3.6 1.3 1.0 0.5 0.3 0.1
0.0 0.0 0.0 0.0 0.0 0.0 0.7 3.3 1.4 1.0 0.5 0.3 0.0
0.0 0.0 0.0 0.0 0.0 0.0 0.0 1.5 1.3 1.1 0.5 0.3 0.0
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.3 0.8 0.9 0.4 0.2 0.0
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.3 0.7 0.4 0.2 0.0
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.2 0.4 0.2 0.0
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.1 0.3 0.2 0.0
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.2 0.0
0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0

SEADAT.DAT (1 of 1)

```
11.483
0 0 0
1.00 2.5 5.0
1.0 1.0 50.0 50.0
0.2 1.0 50.0 50.0
1.0 0.1 50.0 50.0
1.0 1.0 50.0 50.0
1.0 1.0 50.0 50.0
0.25 0.05 0.125 0.025 7.5 1.5
70.0
13
1.640 4.921 8.202 11.483 14.764 18.045 21.325 24.606
27.887 31.168 36.089 42.651 49.213
```

CREEP.DAT (1 of 1)

VERTICAL ACCELERATION EFFECTIVENESS ARRAY

SPEED	WAVE HT.	WAVE PERIOD												
5.00		3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
	49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	95.44	0.00
	36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	92.26	95.56	98.24	0.00
	31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	95.52	98.02	99.37	0.00
	27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	95.09	97.50	99.08	99.80	0.00
	24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	94.44	97.40	98.92	99.70	99.99	0.00
	21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	97.16	99.05	99.68	99.98	100.00	0.00
	18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	97.43	99.11	99.82	99.98	100.00	100.00	0.00
	14.8 •	0.00	0.00	0.00	0.00	0.00	98.76	99.41	99.90	100.00	100.00	100.00	100.00	100.00
	11.5 •	0.00	0.00	0.00	0.00	99.80	99.89	99.99	100.00	100.00	100.00	100.00	100.00	100.00
	8.2 •	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	4.9 •	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	1.6 •	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00
10.00		3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
	49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	94.85	0.00
	36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	92.39	95.16	97.47	0.00
	31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	95.32	97.40	98.99	0.00
	27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	95.12	97.04	98.62	99.59	0.00
	24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	94.97	97.09	98.49	99.51	99.92	0.00
	21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	97.20	98.72	99.50	99.92	100.00	0.00
	18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	97.77	98.97	99.68	99.96	100.00	100.00	0.00
	14.8 •	0.00	0.00	0.00	0.00	0.00	99.15	99.48	99.88	100.00	100.00	100.00	100.00	100.00
	11.5 •	0.00	0.00	0.00	0.00	99.98	99.98	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	8.2 •	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	4.9 •	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	1.6 •	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00
15.00		3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
	49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	94.06	0.00
	36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	91.65	94.22	96.75	0.00
	31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	94.58	96.61	98.42	0.00
	27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	94.62	96.37	97.99	99.31	0.00
	24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	94.72	96.57	97.95	99.12	99.81	0.00
	21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	96.91	98.28	99.21	99.79	100.00	0.00
	18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	97.83	98.73	99.53	99.86	100.00	100.00	0.00
	14.8 •	0.00	0.00	0.00	0.00	0.00	99.30	99.46	99.80	99.99	100.00	100.00	100.00	100.00
	11.5 •	0.00	0.00	0.00	0.00	99.99	99.99	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	8.2 •	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	4.9 •	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	1.6 •	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00

SWSPA OUTPUT (1 of 12)

20.00

	3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	92.99	0.00
36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	90.86	93.38	95.87	0.00
31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	93.85	95.85	97.79	0.00
27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	94.05	95.70	97.35	98.86	0.00
24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	94.53	96.06	97.39	98.65	99.63	0.00
21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	96.67	97.85	98.84	99.62	99.95	0.00
18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	97.91	98.53	99.28	99.73	99.97	100.00	0.00
14.8 •	0.00	0.00	0.00	0.00	0.00	99.37	99.47	99.72	99.93	100.00	100.00	100.00	100.00
11.5 •	0.00	0.00	0.00	0.00	99.99	99.98	99.99	100.00	100.00	100.00	100.00	100.00	100.00
8.2 •	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
4.9 •	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1.6 •	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00

25.00

	3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	92.25	0.00
36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	90.16	92.73	95.20	0.00
31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	93.14	95.27	97.19	0.00
27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	93.57	95.05	96.82	98.36	0.00
24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	94.29	95.60	96.80	98.20	99.33	0.00
21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	96.40	97.43	98.36	99.33	99.88	0.00
18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	97.91	98.30	98.97	99.55	99.92	100.00	0.00
14.8 •	0.00	0.00	0.00	0.00	0.00	99.45	99.43	99.64	99.89	99.99	100.00	100.00	100.00
11.5 •	0.00	0.00	0.00	0.00	99.98	99.99	99.99	100.00	100.00	100.00	100.00	100.00	100.00
8.2 •	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
4.9 •	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1.6 •	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00

30.00

	3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	91.45	0.00
36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	89.70	91.96	94.54	0.00
31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	92.68	94.61	96.63	0.00
27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	93.19	94.64	96.22	97.91	0.00
24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	94.20	95.26	96.41	97.74	99.02	0.00
21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	96.27	97.15	98.04	99.00	99.78	0.00
18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	97.92	98.14	98.76	99.34	99.83	100.00	0.00
14.8 •	0.00	0.00	0.00	0.00	0.00	99.41	99.39	99.55	99.83	99.98	100.00	100.00	100.00
11.5 •	0.00	0.00	0.00	0.00	99.96	99.98	99.98	100.00	100.00	100.00	100.00	100.00	100.00
8.2 •	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
4.9 •	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1.6 •	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00

SWSPA OUTPUT (2 of 12)

LATERAL ACCELERATION EFFECTIVENESS ARRAY

SPEED	WAVE HT.	WAVE PERIOD												
5.00		3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
	49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.28	0.00
	36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.31	54.05	56.80	0.00
	31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.25	59.62	61.96	0.00
	27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.58	61.21	63.69	67.26	0.00
	24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.18	64.63	67.67	70.18	73.33	0.00
	21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	69.62	71.95	74.02	76.62	79.27	0.00
	18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	75.57	77.24	79.13	80.82	82.89	84.94	0.00
	14.8 •	0.00	0.00	0.00	0.00	0.00	82.83	83.39	84.61	85.97	87.18	88.74	90.28	91.89
	11.5 •	0.00	0.00	0.00	0.00	90.35	90.29	90.60	91.32	92.09	92.82	93.65	94.52	95.57
	8.2 •	0.00	0.00	0.00	97.10	96.26	96.07	96.06	96.33	96.69	97.11	97.63	98.18	98.75
	4.9 •	0.00	100.00	100.00	100.00	99.82	99.75	99.79	99.95	100.00	100.00	100.00	100.00	100.00
	1.6 •	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00
10.00		3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
	49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.14	0.00
	36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.56	56.03	58.74	0.00
	31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.21	61.33	63.62	0.00
	27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.40	62.97	64.83	67.81	0.00
	24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.85	65.56	67.74	70.58	73.79	0.00
	21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	70.55	72.62	74.56	76.99	79.64	0.00
	18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	76.83	77.99	79.69	81.26	83.20	85.33	0.00
	14.8 •	0.00	0.00	0.00	0.00	0.00	84.16	84.30	85.15	86.38	87.56	88.98	90.51	92.04
	11.5 •	0.00	0.00	0.00	0.00	91.83	91.23	91.22	91.69	92.31	92.86	93.60	94.51	95.55
	8.2 •	0.00	0.00	0.00	97.92	96.76	96.34	96.17	96.31	96.64	96.98	97.44	97.93	98.49
	4.9 •	0.00	100.00	100.00	100.00	99.97	99.83	99.75	99.83	99.98	100.00	100.00	100.00	100.00
	1.6 •	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00
15.00		3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
	49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.11	0.00
	36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.61	58.45	61.25	0.00
	31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.84	63.42	65.79	0.00
	27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.87	65.31	66.68	69.23	0.00
	24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	66.18	67.52	69.36	71.77	75.02	0.00
	21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	72.39	74.18	75.95	77.98	80.68	0.00
	18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	78.72	79.47	80.80	82.30	83.98	86.04	0.00
	14.8 •	0.00	0.00	0.00	0.00	0.00	86.09	85.68	86.19	87.14	88.27	89.45	90.84	92.18
	11.5 •	0.00	0.00	0.00	0.00	93.15	92.42	92.05	92.14	92.54	93.08	93.75	94.60	95.55
	8.2 •	0.00	0.00	0.00	98.90	97.29	96.69	96.37	96.36	96.58	96.89	97.30	97.78	98.35
	4.9 •	0.00	100.00	100.00	100.00	100.00	99.96	99.82	99.82	99.94	100.00	100.00	100.00	100.00
	1.6 •	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00

SWSPA OUTPUT (3 of 12)

20.00		3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
	49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.91	0.00
	36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.22	61.44	63.62	0.00
	31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.09	66.00	67.82	0.00
	27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	66.15	67.29	68.95	70.74	0.00
	24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	68.23	69.51	71.06	73.47	76.26	0.00
	21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	74.31	75.85	77.31	79.32	81.64	0.00
	18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	80.78	80.97	82.21	83.32	84.92	86.72	0.00
	14.8 •	0.00	0.00	0.00	0.00	0.00	88.88	87.21	87.31	88.13	88.91	90.00	91.09	92.37
	11.5 •	0.00	0.00	0.00	0.00	94.45	93.48	92.72	92.54	92.88	93.26	93.89	94.86	95.57
	8.2 •	0.00	0.00	0.00	99.69	97.90	97.15	96.59	96.44	96.63	96.88	97.22	97.71	98.29
	4.9 •	0.00	100.00	100.00	100.00	100.00	100.00	99.94	99.86	99.97	100.00	100.00	100.00	100.00
	1.6 •	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00

25.00		3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
	49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.20	0.00
	36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.69	63.62	65.55	0.00
	31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	66.21	67.83	69.44	0.00
	27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	67.98	69.14	70.55	72.15	0.00
	24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	69.91	71.08	72.79	75.01	77.46	0.00
	21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	76.15	77.28	78.75	80.58	82.60	0.00
	18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	82.54	82.47	83.35	84.49	85.85	87.45	0.00
	14.8 •	0.00	0.00	0.00	0.00	0.00	89.74	88.64	88.44	88.98	89.61	90.38	91.35	92.58
	11.5 •	0.00	0.00	0.00	0.00	95.38	94.26	93.29	92.94	93.15	93.54	94.09	94.77	95.68
	8.2 •	0.00	0.00	0.00	100.00	98.54	97.64	96.92	96.63	96.71	96.95	97.29	97.71	98.29
	4.9 •	0.00	100.00	100.00	100.00	100.00	100.00	100.00	99.97	100.00	100.00	100.00	100.00	100.00
	1.6 •	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00

30.00		3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
	49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.97	0.00
	36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.48	65.07	67.05	0.00
	31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	67.76	69.14	70.80	0.00
	27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	69.46	70.57	71.78	73.71	0.00
	24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	72.08	73.08	74.47	76.43	78.81	0.00
	21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	78.18	79.01	80.14	81.81	83.77	0.00
	18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	84.45	84.12	84.77	85.60	86.78	88.16	0.00
	14.8 •	0.00	0.00	0.00	0.00	0.00	91.17	89.96	89.49	89.67	90.08	90.79	91.71	92.81
	11.5 •	0.00	0.00	0.00	0.00	96.31	95.08	93.95	93.46	93.54	93.82	94.32	94.92	95.68
	8.2 •	0.00	0.00	0.00	100.00	99.11	98.18	97.35	96.92	96.92	97.08	97.40	97.80	98.34
	4.9 •	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	1.6 •	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00

SWSPA OUTPUT (4 of 12)

ROLL ANGLE EFFECTIVENESS ARRAY

SPEED	WAVE HT.	WAVE PERIOD												
5.00		3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
	49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00
	36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	0.00
	31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	0.00
	27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	0.00
	24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	0.00
	21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	0.00
	18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00
	14.8 •	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	11.5 •	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	8.2 •	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	4.9 •	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	1.6 •	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00
10.00		3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
	49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00
	36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	0.00
	31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	0.00
	27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	0.00
	24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	0.00
	21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	0.00
	18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00
	14.8 •	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	11.5 •	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	8.2 •	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	4.9 •	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	1.6 •	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00
15.00		3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
	49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00
	36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	0.00
	31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	0.00
	27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	0.00
	24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	0.00
	21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	0.00
	18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00
	14.8 •	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	11.5 •	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	8.2 •	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	4.9 •	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	1.6 •	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00

SWSPA OUTPUT (5 of 12)

20.00	3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00
36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	0.00
31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	0.00
27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	0.00
24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	0.00
21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	0.00
18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00
14.8 •	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
11.5 •	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
8.2 •	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
4.9 •	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1.6 •	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00

25.00	3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00
36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	0.00
31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	0.00
27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	0.00
24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	0.00
21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	0.00
18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00
14.8 •	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
11.5 •	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
8.2 •	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
4.9 •	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1.6 •	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00

30.00	3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00
36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	0.00
31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	0.00
27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	0.00
24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	0.00
21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	0.00
18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00
14.8 •	0.00	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
11.5 •	0.00	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
8.2 •	0.00	0.00	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
4.9 •	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1.6 •	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00

SWSPA OUTPUT (6 of 12)

OVERALL EFFECTIVENESS ARRAY

SPEED	WAVE HT.	WAVE PERIOD												
5.00		3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
	49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.28	0.00
	36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.31	54.05	56.80	0.00
	31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.25	59.62	61.96	0.00
	27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.58	61.21	63.69	67.26	0.00
	24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	62.18	64.63	67.07	70.18	73.33	0.00
	21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	69.62	71.95	74.02	76.62	79.27	0.00
	18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	75.57	77.24	79.13	80.82	82.89	84.94	0.00
	14.8 •	0.00	0.00	0.00	0.00	0.00	82.83	83.39	84.61	85.97	87.18	88.74	90.28	91.89
	11.5 •	0.00	0.00	0.00	0.00	90.35	90.29	90.60	91.32	92.09	92.82	93.65	94.52	95.57
	8.2 •	0.00	0.00	0.00	97.18	96.26	96.07	96.06	96.33	96.69	97.11	97.63	98.18	98.75
	4.9 •	0.00	100.00	100.00	100.00	99.82	99.75	99.79	99.95	100.00	100.00	100.00	100.00	100.00
	1.6 •	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00
10.00		3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
	49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.14	0.00
	36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.56	56.03	58.74	0.00
	31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.21	61.33	63.62	0.00
	27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.40	62.97	64.83	67.81	0.00
	24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.85	65.56	67.74	70.58	73.79	0.00
	21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	70.55	72.62	74.56	76.99	79.64	0.00
	18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	76.83	77.99	79.69	81.26	83.20	85.33	0.00
	14.8 •	0.00	0.00	0.00	0.00	0.00	84.16	84.30	85.15	86.38	87.56	88.98	90.51	92.84
	11.5 •	0.00	0.00	0.00	0.00	91.83	91.23	91.22	91.69	92.31	92.86	93.60	94.51	95.55
	8.2 •	0.00	0.00	0.00	97.92	96.76	96.34	96.17	96.31	96.64	96.98	97.44	97.93	98.49
	4.9 •	0.00	100.00	100.00	100.00	99.97	99.83	99.75	99.83	99.98	100.00	100.00	100.00	100.00
	1.6 •	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00
15.00		3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
	49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.11	0.00
	36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.61	58.45	61.25	0.00
	31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.84	63.42	65.79	0.00
	27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.87	65.31	66.68	69.23	0.00
	24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	66.18	67.52	69.36	71.77	75.02	0.00
	21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	72.39	74.18	75.95	77.98	80.68	0.00
	18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	78.72	79.47	80.88	82.36	83.98	86.04	0.00
	14.8 •	0.00	0.00	0.00	0.00	0.00	86.89	85.68	86.19	87.14	88.27	89.45	90.84	92.18
	11.5 •	0.00	0.00	0.00	0.00	93.15	92.42	92.05	92.14	92.54	93.08	93.75	94.60	95.55
	8.2 •	0.00	0.00	0.00	98.90	97.29	96.69	96.37	96.36	96.58	96.89	97.30	97.78	98.35
	4.9 •	0.00	100.00	100.00	100.00	100.00	99.96	99.82	99.82	99.94	100.00	100.00	100.00	100.00
	1.6 •	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00

SWSPA OUTPUT (7 of 12)

20.00		3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
	49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	57.91	0.00
	36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.22	61.44	63.62	0.00
	31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	64.09	66.00	67.82	0.00
	27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	66.15	67.29	68.95	70.74	0.00
	24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	68.23	69.51	71.06	73.47	76.26	0.00
	21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	74.31	75.85	77.31	79.32	81.64	0.00
	18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	80.70	80.97	82.21	83.32	84.92	86.72	0.00
	14.8 •	0.00	0.00	0.00	0.00	0.00	88.08	87.21	87.31	88.13	88.91	90.00	91.09	92.37
	11.5 •	0.00	0.00	0.00	0.00	94.45	93.48	92.72	92.54	92.88	93.26	93.89	94.66	95.57
	8.2 •	0.00	0.00	0.00	99.69	97.90	97.15	96.59	96.44	96.63	96.88	97.22	97.71	98.29
	4.9 •	0.00	100.00	100.00	100.00	100.00	100.00	99.94	99.86	99.97	100.00	100.00	100.00	100.00
	1.6 •	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00

25.00		3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
	49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.20	0.00
	36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.69	63.62	65.55	0.00
	31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	66.21	67.83	69.44	0.00
	27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	67.98	69.14	70.55	72.15	0.00
	24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	69.91	71.08	72.79	75.01	77.46	0.00
	21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	76.15	77.28	78.75	80.58	82.60	0.00
	18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	82.54	82.47	83.35	84.49	85.85	87.45	0.00
	14.8 •	0.00	0.00	0.00	0.00	0.00	89.74	88.64	88.44	88.98	89.61	90.38	91.35	92.58
	11.5 •	0.00	0.00	0.00	0.00	95.38	94.26	93.29	92.94	93.15	93.54	94.09	94.77	95.60
	8.2 •	0.00	0.00	0.00	100.00	98.54	97.64	96.92	96.63	96.71	96.95	97.29	97.71	98.29
	4.9 •	0.00	100.00	100.00	100.00	100.00	100.00	100.00	99.97	100.00	100.00	100.00	100.00	100.00
	1.6 •	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00

30.00		3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
	49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	61.97	0.00
	36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	63.44	65.07	67.05	0.00
	31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	67.76	69.14	70.80	0.00
	27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	69.46	70.57	71.78	73.71	0.00
	24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	72.08	73.08	74.47	76.43	78.81	0.00
	21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	78.18	79.01	80.14	81.81	83.77	0.00
	18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	84.45	84.12	84.77	85.60	86.78	88.16	0.00
	14.8 •	0.00	0.00	0.00	0.00	0.00	91.17	89.96	89.49	89.67	90.08	90.79	91.71	92.81
	11.5 •	0.00	0.00	0.00	0.00	96.31	95.08	93.95	93.46	93.54	93.82	94.32	94.92	95.68
	8.2 •	0.00	0.00	0.00	100.00	99.11	98.18	97.35	96.92	96.92	97.08	97.40	97.80	98.34
	4.9 •	0.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	1.6 •	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	0.00

SWSPA OUTPUT (8 of 12)

OPERATIONAL HEADING FRACTION

SPEED	WAVE HT.	WAVE PERIOD												
5.00		3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
	49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.00
	24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.46	0.85	0.00
	21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.62	1.00	1.00	1.00	0.00
	18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
	14.8 •	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	11.5 •	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	8.2 •	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	4.9 •	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.6 •	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
10.00		3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
	49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00
	27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.38	0.00
	24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.23	0.31	0.54	0.85	0.00
	21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.54	0.69	1.00	1.00	1.00	0.00
	18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
	14.8 •	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	11.5 •	0.00	0.00	0.00	0.90	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	8.2 •	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	4.9 •	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.6 •	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
15.00		3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
	49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.15	0.23	0.00
	27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.23	0.31	0.38	0.00
	24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.31	0.46	0.62	1.00	0.00
	21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.85	1.00	1.00	1.00	0.00
	18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
	14.8 •	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	11.5 •	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	8.2 •	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	4.9 •	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.6 •	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00

SWSPA OUTPUT (9 of 12)

20.00		3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
	49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00
	31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.31	0.38	0.00
	27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.31	0.38	0.54	0.00
	24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.38	0.46	0.54	0.77	1.00	0.00
	21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.92	1.00	1.00	1.00	1.00	0.00
	18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
	14.8 •	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	11.5 •	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	8.2 •	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	4.9 •	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.6 •	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00

25.00		3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
	49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.15	0.23	0.00
	31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.38	0.46	0.00
	27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.38	0.38	0.54	0.62	0.00
	24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.54	0.62	1.00	1.00	0.00
	21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
	18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
	14.8 •	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	11.5 •	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	8.2 •	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	4.9 •	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.6 •	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00

30.00		3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0
	49.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	42.7 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15	0.00
	36.1 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.23	0.23	0.00
	31.2 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.38	0.46	0.54	0.00
	27.9 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.46	0.62	0.77	0.00
	24.6 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.69	0.85	1.00	1.00	0.00
	21.3 •	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
	18.0 •	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
	14.8 •	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	11.5 •	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	8.2 •	0.00	0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	4.9 •	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	1.6 •	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00

SWSPA OUTPUT (10 of 12)

SUSTAINABLE SPEED ARRAY

WAVE HT													
49.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
42.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.00	0.00
36.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.00	30.00	30.00	0.00
31.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.00	30.00	30.00	0.00
27.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.00	30.00	30.00	30.00	0.00
24.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.00	30.00	30.00	30.00	30.00	0.00
21.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.00	30.00	30.00	30.00	30.00	0.00
18.05	0.00	0.00	0.00	0.00	0.00	0.00	30.00	30.00	30.00	30.00	30.00	30.00	0.00
14.76	0.00	0.00	0.00	0.00	0.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
11.48	0.00	0.00	0.00	0.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
8.20	0.00	0.00	0.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
4.92	0.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
1.64	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	0.00
	3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0

WAVE PERIOD

EFFECTIVE SPEED ARRAY

WAVE HT													
49.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
42.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.62	0.00
36.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.92	6.92	6.92	0.00
31.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.54	13.85	16.15	0.00
27.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.85	13.85	18.46	23.08	0.00
24.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	18.46	20.77	25.38	30.00	30.00	0.00
21.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.00	30.00	30.00	30.00	30.00	0.00
18.05	0.00	0.00	0.00	0.00	0.00	0.00	30.00	30.00	30.00	30.00	30.00	30.00	0.00
14.76	0.00	0.00	0.00	0.00	0.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
11.48	0.00	0.00	0.00	0.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
8.20	0.00	0.00	0.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
4.92	0.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
1.64	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	0.00
	3.2	4.8	6.3	7.5	8.8	9.7	10.9	12.4	13.8	15.0	16.4	18.0	20.0

WAVE PERIOD

SWSPA OUTPUT (11 of 12)

OVER-ALL SEAKEEPING PERFORMANCE

MEAN SUSTAINABLE SPEED= 30.00

MEAN EFFECTIVE SPEED= 29.30

SPEED	EFFECTIVENESS FACTORS(PERCENT)				
(KT)	VERT. ACC.	LAT. ACC.	ROLL	OVER-ALL	FRACTION
5.0	99.7	91.1	100.0	91.1	.937
10.0	99.7	91.5	100.0	91.5	.942
15.0	99.6	92.1	100.0	92.1	.952
20.0	99.6	92.7	100.0	92.7	.964
25.0	99.5	93.3	100.0	93.3	.970
30.0	99.4	93.9	100.0	93.9	.977

SWSPA OUTPUT (12 of 12)

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13. ABSTRACT

A computer program package for assessing the seakeeping performance of SWATH ships is described. This package is based on an existing ship motion computer program, SWATM2. The seakeeping performance analysis process is automated and combined with a recently-published North Atlantic wave data base. The resulting package performs the following functions:

(1) Computes ship motions for the entire range of sea conditions for a user-specified ocean area in the North Atlantic.

(2) Applies seakeeping criteria to compute seakeeping performance parameters, such as maximum sustainable speed and maximum effective speed, for each heading and sea condition.

(3) Averages the seakeeping performance parameters over all headings to obtain mean values for each sea condition.

(4) Obtains averages over all sea conditions by weighting each sea condition in accordance with the North Atlantic wave data base.

DSIS
78-078

KEY WORDS

SWATH
Ship motion computer program
Seakeeping performance
wave data base
North Atlantic

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